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Review of Risk Communication Strategies And Existing Alcohol- Impaired and Distracted Driving Safety Messages: Technical Report

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16. Abstract This project included tasks designed to identify psychological and communication theory to support traffic safety campaigns, identify campaigns currently using theory, obtain information from States about current traffic safety campaigns, and create resources for States and local jurisdictions to aid them in appropriately applying effective, theory-based campaign approaches for the prevention of distracted driving behavior (DDB) and alcohol-impaired driving (impaired driving). Work in this report consisted of: (1) an internet search of web-accessible campaigns to prevent DDB and impaired driving implemented by States, local jurisdictions, and non-government entities; (2) a literature review of health and safety communication strategies and the communication and psychological theories likely to support campaigns that prevent DDB and impaired driving; (3) an expert panel to categorize the DDB and impaired-driving campaigns according to their theoretical underpinnings and development of material to aid the expert panel; and (4) a survey of representatives of States for more information about the DDB and/or impaired-driving campaigns implemented in their States. The methods and results in this technical report were used to provide the content of products that States and jurisdictions can use to improve existing campaigns and to develop more effective campaigns to combat behaviors that compromise driving safety, particularly impaired driving and DDB. This project was conducted under the National Cooperative Research and Evaluation Program, a cooperative program between NHTSA and the Governors Highway Safety Association (GHSA). Each year, the States (through the GHSA) identify highway safety research or evaluation topics they believe are important for informing State policy, planning, and programmatic activities.			
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Abbreviations

APE	associated-propositional evaluation model
AT	automaticity theory
ATB	attitude toward behavior
BAS	behavioral activation system
BIS	behavioral inhibition system
DDB	distracted-driving behavior
DUI	driving under the influence
DWI	driving while impaired
EIM	emotion information management
ELM	elaboration likelihood model
EPPM	extended parallel process model
FFS	fight-flight system
FTT	fuzzy-trace theory
HAPA	health action process approach
HBM	health belief model
HVE	high-visibility enforcement
II	implementation intentions
IMB	information-motivation-behavioral skills model
PAMT	physical activity maintenance theory
PAPM	precaution adoption process model
PBC	perceived behavioral control
PMT	protection motivation theory
PPM	PRECEDE-PROCEED ¹ model
PT	prospect theory
PWM	prototype willingness model
RAA	reasoned action approach
RFT	regulatory fit theory
RST	reinforcement sensitivity theory
r-RST	revised reinforcement sensitivity theory
SCT	social cognitive theory
SDT	self-determination theory
SJT	social judgement theory
SLT	social learning theory
SN	subjective norms
SNT	social norms theory
TBI	theory of bystander intervention
TIB	theory of interpersonal behavior
TM	transtheoretical model/stages of change
TPB	theory of planned behavior
TRA	theory of reasoned action
TSR	theory of self-regulation

¹ Editor's Note: These are capitalized because they are acronyms. PRECEDE stands for Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation. Second is an ecological diagnosis, PROCEED, for Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development.

Executive Summary

Purpose

This project identified psychological and communication theories that support behavior change campaigns for the prevention of distracted driving behavior and alcohol-impaired driving. This research will further psychology and traffic safety professionals' understanding of how behavior theory, when incorporated into program design, can support such communication campaigns. One emphasis of the research is on campaigns that complement high-visibility enforcement. Please see the accompanying resources which present recommendations and examples to safety professionals for developing campaigns using behavior change theories in their DDB and impaired-driving campaigns.

Background

There were an estimated 42,939 fatalities from motor vehicle crashes (MVCs) in 2021 (National Center for Statistics and Analysis, 2023a). Together, DDB and impaired driving are factors in a significant proportion of motor vehicle-related deaths and injuries. Communication campaigns are among the most widely used efforts to promote traffic safety and are used to promote safe driving practices and knowledge of traffic laws, and otherwise educate the public (Robertson & Pashley, 2015). According to the Oxford Dictionary (2019), a theory is: a supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained. Theories are composed of constructs (or ideas) that are combined with predicted processes and influences that underlie the explanation. The use of appropriate theories in campaigns provides testable hypotheses and identifies meaningful measures for effectiveness evaluation. Additionally, theories have underlying constructs (e.g., perceived control, SN, behavioral beliefs, efficacy, motivation) that can be used in the design and evaluation of campaigns. The use of a theoretical design improves a campaign's logic and internal consistency.

This report documents the technical work undertaken for this project. The work completed for each of the project tasks is described, along with associated findings and information about how the findings and tasks fit together and collectively fit within the broader study.

Methodology

Theory and campaign information was collected and organized over several steps.

1. A literature search of health and safety communication strategies and the communication and psychological theories likely to apply to campaigns to prevent DDB and impaired driving: 29 behavior change theories were selected.
2. An internet search of web-accessible campaigns to prevent DDB and impaired driving implemented by States, local jurisdictions, and non-government entities.
 - a. Selection criteria included: the campaign must include a message and tagline; it must be possible to identify the geographic region for the campaign (the entire USA was allowable); it must be possible to identify the target audience (all vehicle occupants was allowable); text and audio must be available in English; and the campaign must have some outreach component (e.g., radio, video, billboard) as opposed to only presenting information on a website.
 - b. Sixteen DDB campaigns and 13 impaired-driving campaigns were selected.

3. An expert panel review of the campaigns and categorization of the campaigns by theory.
 - a. The panel was asked to review each DDB/impaired-driving campaign and assess the application of each theory (and its associated constructs) in that campaign.
 - b. Panelists considered a theory or construct applied if it was observed in the campaign, regardless of whether they thought its presence was intended to represent the theory.
 - c. Panelists also did not necessarily know how the campaigns were implemented and assumed that the target audience was exposed to all material.
4. Interviews with State Highway Safety Office (SHSO) representatives to obtain more detail about DDB and impaired-driving campaigns implemented in those States.

Major Findings

One important finding from the study was that behavior change theory was observed in many campaigns. The findings of the expert panel showed that, on average, 2 theories were applicable to (observed/displayed in) the content of the campaigns (range = 0 to 8 theories). Some theories were partially observed in campaigns as were several constructs. *Faces of Drunk Driving* had the most theories observed at 8 (extended parallel process model, health action process approach, health belief model, implementation intentions, information-motivation-behavioral skills model, protection motivation theory, social cognitive theory, and social learning theory). The campaign material included videos that highlighted the severity of consequences, actions that could be taken to prevent impaired driving (self-efficacy, perceived benefits, perceived barriers, and cues for the audience to act). The panelists were concerned that there was an imbalance between the strength of the efficacy messaging and the severity messaging (that the level of fear presented outweighed the level of efficacy), but ultimately decided that the balance was close enough to consider this theory applied. X the TXT had the fewest theories observed with 0 and only 1 construct applied (behavioral intentions). This campaign consisted of a Facebook page that included a pledge to not text while driving.

The IMB was observed in the most campaigns ($n=16$). It was originally used to describe HIV-related risk behaviors and suggests that information, motivation (personal and social), and behavioral skills (self-efficacy/confidence) predict risky behavior (Fisher & Fisher, 1992). In the literature review, evidence of this theory was found for other health-related behaviors but not for DDB or impaired driving, and it did not initially meet the criteria for inclusion in the expert panel evaluation, so it is interesting that it was observed in so many campaigns here (and equally for DDB and impaired driving). This theory also supplied the most frequently observed construct, information, which was observed in 25 of the 29 campaigns. In the campaigns considered, information to educate the target audience was observed most often in the form of describing or defining the target behavior (e.g., a campaign included the definition in its campaign material of distracted driving as anything that takes the driver's focus away from the roadway) and statistics about the prevalence and consequences of the target behavior. The other theories determined to be observed in the most campaigns were HBM ($n=15$), EPPM ($n=13$), deterrence theory ($n=12$), SLT ($n=12$), HAPA ($n=11$), SCT ($n=11$), and theory of interpersonal behavior ($n=10$).

Another general finding was that constructs, which make up theories, were commonly observed in campaigns. Several of the most frequently observed theories have constructs in common with

one another. The terms used to describe the constructs may differ among theories, but the underlying meaning is often similar. For example, the idea behind the construct of information in the IMB is that the audience needs to be presented with information about the behavior and the risks it poses before they can become motivated to change. Many theories include the constructs of threat appraisal, risk perception, susceptibility, and/or severity, which imply having some information about the risky behavior of interest (e.g., extended parallel processing model, HAPA, HBM). Many theories also include some notion of motivation as a precursor to behavior change (e.g., HAPA). What differs across these various theories is the extent to which they employ these constructs and the other factors that come into play.

A limited number of interviews with SHSO representatives responsible for administering some of the campaigns included in the study were conducted to obtain more information about the campaigns and general thoughts and suggestions about designing campaigns. The following findings resulted from the interviews.

- Campaign design and development approaches appear to be homogeneous among States. In general, ideas and designs follow recommendations by the National Highway Traffic Safety Administration and are developed by the private sector.
- A broad range of media was used to deliver campaigns including public service announcements, posters, billboards, pledge cards, newsletters, email blasts, radio ads, and websites. Some States are shifting towards social media.
- Most campaigns were conducted statewide. Most of those that targeted specific populations and locations were limited to 18- to- 34-year-old males and distinct counties.

Conclusions

The project findings showed that campaigns currently incorporate behavior change theories and that the theories may increase the likelihood that the campaigns will reach their intended goals. Furthermore, behavior change theories could be considered alongside the other components of the campaign design and development process. One impediment that this project addressed is the lack of user-friendly information about behavior change theories that States can use in planning and designing campaigns. Key takeaways from assessing behavior theories used in impaired-driving and DD campaigns include the following:

- Behavior theory is evident in current campaigns, although its use is not necessarily intentional.
- The identification of specific theories observed in a current campaign can be subjective, even to experts. The low observation frequency of many theories and the lack of agreement among expert panel members during their independent reviews suggests that *specific* theories and theory constructs were often not clear in the campaigns examined, even to experts.
- Results from the literature review suggested that no single theory should be held up as the only useful theory for DDB/impaired-driving campaign development. Theory selection should be based on consideration of several factors including the behaviors addressed and target audiences.
- Given current approaches to designing and developing campaigns, such as modifying existing campaigns, targeting populations and location, using a variety of media, and supporting an HVE effort, behavior theory should be incorporated into campaign design

and development. However, evaluation is needed to determine the specific impacts of behavior change theory on campaign effectiveness.

- States want to run cost-effective campaigns and would accept help with campaign design and evaluation. But the assistance needs to be easily understood and usable. Behavior change theory needs to be presented in a straightforward way with several examples.

Introduction

There were 42,939 fatalities from MVCs in 2021 (NCSA, 2023a). In 2020 alcohol-impaired drivers were involved in crashes resulting in 31% of all MVC fatalities (NCSA, 2023a), and drivers classified as displaying DDB were estimated to have been involved in crashes that resulted in 8% of all MVC fatalities (NCSA, 2023b). The burden of harm for both alcohol-impaired and distracted-affected crashes extends when considering nonfatal injuries. DDB, for example, was estimated to have contributed to 362,415 injuries in 2021 (NCSA, 2023b). Together, DDB and impaired driving are factors in a large proportion of motor vehicle-related deaths and injuries.

Communication campaigns are among the most widely used efforts to promote traffic safety and can be used to promote safe driving practices and knowledge of traffic laws, and otherwise educate the public (Robertson & Pashley, 2015). This project was conducted to identify psychological and communication theories to support campaigns to change behavior. According to the Oxford Dictionary (2019), a theory is: a supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained. Theories are composed of constructs (or ideas) that are combined with predicted processes and influences that underlie the explanation and can be measured. Examples of constructs include attitudes, norms, feelings of control, motivation, self-esteem, and beliefs. Theories and their underlying constructs can be used in the design of campaigns and development of campaign messages. In addition, the use of appropriate theories in campaigns identifies meaningful measures for effectiveness evaluation in the form of metrics that operationalize theory constructs. Finally, the presence of logic, internal consistency, testability, measurability, and plausibility are enhanced using a design based on an accepted and relevant theory.

This technical report documents the work undertaken for this project which encompassed: a review of the literature to identify theories likely to impact DDB and impaired driving, the identification of a sample of DDB and impaired-driving campaigns for review by an expert panel, the convening of an expert panel to assess the observation of theory in current campaigns to prevent DDB and impaired driving, and completion of interviews with representatives of States with DDB or impaired-driving or both campaigns for more information. The work completed for each task is described, along with findings from each task and information about how the findings and tasks themselves fit together and collectively fit within the broader study.

While campaigns and theories with elements of HVE were included in the project to a limited extent, the project focused primarily on non-enforcement-based campaigns and theories with the intention of giving States ideas for campaigns that could supplement and complement their HVE efforts.

Literature Review

A literature review was conducted to identify non-enforcement-based health and safety communication strategies and the communication and psychological theories likely to support campaigns to prevent DDB and impaired driving. The review was not limited to impaired driving and DDB, but included literature relevant to health and traffic safety, more generally. For example, the review included campaigns to deter speeding. The search targeted theoretical articles related to changing DDB and impaired driving, and examined behavior change across a broad range of health behaviors, with a goal of finding articles about behavior change theories, interventions, and campaigns that could potentially be applied to DDB and impaired driving.

The literature review had three key foci:

- (i) research that evaluated a theory or tested how well theories and theoretical constructs predicted behaviors,
- (ii) research examining theory applied to communication strategies in evaluation studies of health/safety campaigns, and
- (iii) other evidence related to theory (whether a specific theory was mentioned or not).

The literature review resulted in two documents: an annotated bibliography and a letter report. The annotated bibliography was an internal document that included a brief description of each publication included in the study (organized by the literature review's key foci). The literature search methods are available in Appendix A, Annotated Bibliography. The publications listed in the annotated bibliography were then used in the letter report, along with descriptions of the key theories, to inform an integrated discussion of evidence supporting the selection of theories that could be applied to impaired driving and DDB (Appendix A).

Letter Report

A letter report (Appendix A) was developed based on the annotated bibliography, which described each of the 152 documents included in the results of the literature searches based on the theory and constructs studied, sample or target population, research design, outcome of the study (e.g., behavior, intention, and other outcomes such as crashes or criminal experiences), and any limitations or other comments about the application of the study. The letter report was intended to provide insights into behavior change and communication theories that are observed or could be used in communication campaigns to address DDB and impaired driving. It presented findings about theories and theoretical constructs separately for DDB and impaired driving and other health behaviors and included strategies for the delivery of campaign messages, such as message framing and fear appeal strategies. Based on the findings, the letter report made recommendations for the expert panel about the theories to use in the categorization of campaigns.

Focus 1 – Documents/Studies Examining Theory Fit

Fourteen behavior change theories were addressed in studies that examined the use of theories (theory fit) in DDB, impaired driving, other risky driving behaviors, and/or health behaviors (Table 1). It was assumed that theories used in any of these behaviors could be relevant. The studies assessed whether various theories or theoretical constructs were associated with engagement in a particular risky behavior or behaviors. The theory of planned behavior was the most frequently examined theory. Twenty-eight studies evaluated it—11 regarding DDB, 9

regarding impaired driving, 6 regarding other driving behaviors, and 2 regarding health behaviors. Other theories that fit DDB or impaired driving or both included automaticity theory, HBM, prototype willingness model, reinforcement sensitivity theory, and theory of reasoned action. Broadening the scope to other driving behaviors included the HAPA and SCT in this section. Broadening the scope to other health behaviors added the EPPM, IMB, prospect theory, PMT, regulatory fit theory, and self-determination theory. (See Use of Theories in Campaigns and Appendix A, “Theories” section for descriptions of each.)

*Table 1. Theories included in studies in literature review by behavior**

Theory Name	Behavior				Total
	DDB	Impaired Driving	Other Driving	Health	
Automaticity theory	1	1	0	2	4
Extended parallel process model	0	0	0	1	1
Health action process approach	0	0	1	1	2
Health belief model	2	1	3	0	6
Information-motivation-behavioral skills model	0	0	0	1	1
Prospect theory	0	0	0	1	1
Protection motivation theory	0	0	0	1	1
Prototype willingness model	0	1	1	0	2
Reinforcement sensitivity theory	0	1	2	0	3
Regulatory fit theory	0	0	0	1	1
Self-determination theory	0	0	0	1	1
Social cognitive theory	0	0	1	1	2
Theory of planned behavior	11	9	6	2	28
Theory of reasoned action	0	1	0	0	1
Total	14	14	14	12	54

* If a theory is examined or mentioned in a study regarding more than one behavior, it may show up more than once in the table (e.g., if it is examined for both impaired driving and health). Thus, the numbers in the table represent study mentions rather than distinct studies.

DDB =Distracted-Driving Behavior

ID=Alcohol-Impaired Driving

Evidence supported the utility of each theory in helping predict or at least understand the behavior or behavioral intent of interest, although sociodemographic and other characteristics of study participants such as age, sex, and trip purpose often influenced effect sizes. There was considerable variation across studies in terms of whether the theory of interest was used, whether some constructs were omitted, or conversely, whether additional constructs were included. There was also variation in measures and tests used, whether outcomes focused on intentions or actual behavior, the size, and characteristics of the study samples, how generalizable the results were, and the actual effect sizes. Nevertheless, in terms of theory fit, results from this section suggest that no single theory should be held up as the only useful theory for campaign development for DDB and impaired driving. Rather, the selection of theories and their underlying constructs should result from informed consideration of the target behaviors (i.e., the behaviors you are trying to change) and the characteristics of the target audiences. Please refer to the letter report for an evaluation of evidence about the effectiveness of using particular theories in designing campaigns to prevent DDB and impaired driving among particular audiences.

The literature review identified several documents in which behavior change theories were used in the design and implementation of impaired-driving and DDB campaigns and efforts targeting other traffic safety and health behaviors; they are discussed in the “Evaluation of campaign studies” section of the letter report. Many of the documents described in that section provide evidence for the importance of considering behavior change theory as a guide to campaign design, primarily about the development of campaign material. For example, TPB was explicitly used as the guiding framework for the development of material in a successful campaign to reduce speeding behavior (Stead et al., 2002, 2005). There is also evidence to support the idea that theories, as opposed to using only a construct or two from a single theory, are more effective at producing behavior change (e.g., LaVoie & Quick, 2013; Nathanail & Adamos, 2013).

Focus 2 – Evaluation or Campaign Studies

The findings presented in the “Evaluation of campaign studies” section of the letter report also emphasized that controlled scientific studies evaluating theory used in persuasive messaging as well as the evaluation of the material themselves can also contribute to the development of more successful campaign material. Two studies demonstrated the efficacy of both emotion information management and elaboration likelihood model in explaining how emotional appeals affect attitudes and behavioral intentions toward impaired driving. Another study used RFT as the basis for studying one-sided and two-sided messaging on peoples’ intention to reduce driving speed. Collectively, the information derived from experimental studies about campaign messaging can be used to appropriately tailor material for future traffic safety campaigns.

Focus 3 – Other Evidence of Theory

The “Other evidence of theory” section of the letter report presented a discussion of documents that provided evidence in support of theories from meta-analyses as well as pertinent commentaries, and reviews. Together, the findings presented in Appendix A sections "Evaluation of campaign studies" and "Other evidence of theory" list an additional 14 behavior change theories for the expert panel to assess. This resulted in 28 theories identified via the literature review. The additional theories included the associative-propositional evaluation model, ELM, EIM, fuzzy-trace theory, II, precaution adoption process model, PRECEDE-PROCEED model, social judgement theory, SLT, social norms theory, theory of bystander intervention, TIB, theory of self-regulation, and transtheoretical model/stages of change.

Selection of Theories Considered by the Expert Panel

The selection of theories to include in the expert panel's review of campaigns was guided by evidence found in the literature review and reported in the letter report (Appendix A). Specifically, the investigators used the following criteria to select theories for inclusion.

1. The strength of the evidence that the theory was predictive of behavior generally (including both driving and health behaviors).
2. The strength of the evidence that the theory was predictive of DDB and impaired driving specifically.

The investigators considered an additional criterion – the feasibility of incorporating the theory into the development of mass campaigns – but decided to note this as a potential limitation rather than apply it as a reason for excluding any theory. Based on the application of the two criteria to the set of theories identified in the literature review, the investigators selected all 28 theories. A final additional theory, deterrence theory, was added at the request of an outside expert leading to a total of 29 theories for classification by the expert panel.

Sample of DDB and Impaired-Driving Media Campaigns

The investigators searched for DDB and impaired-driving campaigns, accessible via the web, implemented by States and local jurisdictions and by non-government entities. The campaigns included both original campaigns and those adapted from a campaign initially developed by another organization.

Methods to Create Campaign Sample

Strategy and Search Terms

The investigators first identified websites to examine directly, including State and Federal traffic and health or human services department websites (e.g., trafficsafetymarketing.gov). The websites of organizations known to have an interest in promoting traffic safety were also examined for information about campaigns (e.g., National Safety Council, AAAFTS, Federal Communications Commission Clearinghouse, Governors Highway Safety Association, Mothers Against Drunk Driving, and the Insurance Institute for Highway Safety).

To ensure that the search was sufficiently broad to allow the discovery of innovative campaigns targeting DDB and impaired-driving behaviors, the investigators used the search engine Google to conduct searches using terms that fell within three clusters of words, or related terms: (1) driving; (2) the target factor (alcohol impairment or distraction); and (3) campaigns (see Table 2 for examples of specific search terms within those clusters). Search terms were revised as the investigators searched through campaigns and found additional appropriate terms.

Table 2. Example search terms

Driving	drive, car, motor vehicle, transport, traffic.
Target Factor	DDB: distraction, cell, mobile, internet, web, text, electronic device, passenger, read, grooming, navigation device. Impaired driving: alcohol, drink, buzzed, impaired, wine, beer. Sufficient terms were included to accommodate variations in nomenclature, for example, DWI and DUI.
Campaign	campaign, advertisement.

Selection of DDB and Impaired-Driving Campaigns

The search identified more than 100 campaign websites that underwent extensive review by the investigators to determine if they presented sufficient information for evaluation by the expert panel. The investigators reviewed only active websites (i.e., not cached) identified in the search. Campaigns were selected if the websites presented sufficient information:

1. for the expert panel to sort the campaign strategies into theory-based categories, and
2. to ensure that enough information was available to describe the campaigns in the guidance for States and local jurisdictions provided as products of this research.

Here are examples of information identified as important for understanding each campaign.

- State or local jurisdiction
- Safety issue addressed
- Campaign's objective
- Description of the communication campaign

- Start and end dates
- Populations targeted
- Key messages
- Description of messages intended to change behavior
- Measures or indications of effectiveness (if any)

Few of the websites presented this level of information and no website presented the full list; therefore, an important factor in the selection process was whether the website met the project's definition of a campaign. The investigators carefully considered how to define campaign for this project and used the following criteria, all which had to be met, for inclusion in the final inventory of campaign websites:

1. the campaign must include a message and tagline,
2. it must be possible to identify the geographic region for the campaign (broad campaigns targeting the entire USA were allowable),
3. it must be possible to identify the target audience (all vehicle occupants was allowable),
4. text and audio available in English (but could also use other languages), and
5. the campaign must have some outreach component (e.g., radio, video, billboard) as opposed to only presenting information on a website.

Description of the Campaign Sample

Ultimately, 29 campaigns were selected to be evaluated by the expert panel (16 DDB campaigns and 13 impaired-driving campaigns). The scope of this project only allowed the investigators to obtain information about the campaigns from the campaign websites (other than the small sample of interviews with States; see Interviews With State Highway Safety Office Representatives). Therefore, this project's knowledge base about the campaigns' objectives, target audiences, strategies, messages, material, and so forth was limited to the information that appeared on the campaign websites at the time the study was conducted. A brief description of each campaign, based on that information, is presented in Appendix A-1.

Videos were used in almost every campaign. Eleven campaigns (6 DDB and 5 impaired driving) used stories/testimonials from drivers, victims, and family members in videos, 8 campaigns (6 DDB and 2 impaired driving) used humor, 7 campaigns (5 DDB and 2 impaired driving) depicted crashes in videos, and 7 campaigns (3 DDB and 4 impaired driving) featured legal consequences in videos. Few campaigns featured celebrities in videos (1 DDB and 1 impaired driving). Other commonly used campaign components included:

- the presentation of information or statistics or both about the prevalence or consequences or both of DDB and impaired driving (15 DDB and 10 impaired driving),
- tips or strategies for preventing DDB and impaired driving (6 DDB and 6 impaired driving), pledges to avoid DDB and impaired driving (9 DDB and 1 impaired driving),
- the use of social media (7 DDB and 5 impaired driving), and
- posters and other printable material (8 DDB and 6 impaired driving).

As shown in the campaign descriptions (Appendix A-1), most campaigns incorporated several of the components.

Expert Panel

An expert panel was convened to categorize the campaigns according to their theoretical underpinnings. The panel included experts in the fields of traffic safety, cognitive social psychology (an expert in media, communications, and psychological theory), and communications subject matter (an expert in health behavior and health education with extensive experience in traffic safety, including distracted and alcohol impaired driving prevention). The expert panel's skill set enabled efficient and accurate coding of campaigns, including consideration of context and details like the target audience, based on the theories reflected in the communication strategies they used.

The expert panel reviewed each DDB and impaired-driving campaign selected for the study and assessed the observed applicability of each theory (and its associated constructs) in that campaign. An electronic inventory provided the expert panel with links to the campaigns. The inventory was then used by the panelists to independently review the campaign material and record their theory-based categorizations. The investigators developed an inventory structure that presented the campaigns to the expert panel within a systematic, user-friendly framework and chose the online program, Research Electronic Data Capture (REDCap),² to manage the electronic inventory of campaigns, administer the campaign-theory assessment questions to the expert panel, and maintain all associated data securely. The investigators created and demonstrated a REDCap user guide with step-by-step instructions for using REDCap, assessing the campaigns, and entering their assessments, and provided the expert panel with a quick-reference guide that summarized the 29 theories. At a kickoff meeting with the panel, the investigators presented an overview of the project and demonstrated how to assess a campaign using REDCap, with 2 motorcycle safety campaigns that were not among the campaigns that the panel assessed serving as examples.

The expert panel assessed the campaigns at two levels: (1) theory and (2) construct. Panelists were first asked to determine if a theory was observed in a campaign and then which, if any, of the theory's constructs were observed.

To provide further guidance to the expert panel, the investigators carefully considered how best to operationalize the observation of a theory or construct in a campaign. Most of the campaign websites did not include information about how the campaign was developed or its theoretical underpinnings. Therefore, it was not feasible to ask the expert panel to determine which theories and constructs a campaign was intentionally based upon. Instead, panelists considered a theory or construct observed if it was displayed in the campaign, regardless of whether they thought it was purposeful or intentional. Panelists also did not necessarily know how the campaigns were implemented and therefore assumed that the target audience was exposed to all material.

The investigators created a series of questions to guide the panelists through their assessments of each campaign. Within each campaign, the 29 theories were presented one at a time, in alphabetical order. Panelists were first asked if the respective theory was observed (e.g., was the associative-propositional evaluation model observed in this campaign?). REDCap required panelists to select one of three options:

² REDCap, Vanderbilt University, 2004. www.project-redcap.org

1. not applicable to this campaign,
2. applicable to this campaign, or
3. unsure if applicable to this campaign.

Instructions to the panel included:

- if at least one construct from a theory was observed in the campaign, mark the theory as applied;
- only evaluate if a theory/construct was observed, not if it appears the campaign was developed with the theory/construct in mind;
- base judgments on the campaign material;
- when links were provided to multiple versions of a campaign, note any differences between campaigns that influenced categorization decisions; and
- do not conduct additional searches on the campaign, use only the links provided by the investigators and on the campaign websites.

If panelists selected not applicable (i.e., not observed), they then clicked the Next Page button and REDCap presented the same question for the next theory. If the panelists selected applicable (i.e., observed) or unsure, then two additional questions appeared on the screen. First, a list of the constructs associated with that theory appeared and the panelists were asked to check each construct observed in the campaign. Second, panelists were asked to explain their selection (of the theory and constructs) in a text box. REDCap required panelists to enter text into the box and panelists were instructed to provide as much detailed information as possible (including information about the specific campaign material that contributed to their decision), as it would provide the framework for the expert panel discussion later. Panelists repeated this sequence of questions and answers for each of the 29 theories. After the last theory was presented, panelists were asked to list any additional theories or constructs not included in REDCap applied to the campaign and to provide an explanation. A Notes box was also provided to allow the panelists to add any additional comments, feedback, or concerns about the campaign. Next, panelists were asked to indicate groups or audiences the campaign was targeted toward (e.g., males/females, teenagers, older adults, specific race/ethnic groups, parents, college students, employees). A Notes box was provided at the end of this section to allow panelists to add any additional comments about the target populations. Finally, the panelists were asked to indicate the campaign material they viewed. This approach created a systematic review process that consistently obtained complete information about the theories and constructs observed in each campaign.

Panelists were allowed to complete the campaigns in any order, to save their work and return later, and to re-visit completed campaigns to review and edit their responses. The campaign links opened in separate tabs, allowing REDCap to remain open in the original tab while panelists explored the campaign website. This allowed the panelists to explore the campaign website under their own guidance and view material as they saw fit. Upon completion of their individual assessments, panelists met to discuss their decisions and attempted to reach consensus regarding categorization of theories and constructs as observed or not observed. A study team member experienced in qualitative data collection methods facilitated the meeting. Prior to beginning discussion of the first campaign, the panelists discussed their instructions from the investigators for defining applicable (i.e., observed) and the requirements for considering a construct or theory applicable. For constructs, panelists focused on the messages conveyed by the campaign

slogans/material and assessed if there was strong enough evidence of the construct in those messages. Panelists attempted to avoid evaluating the effectiveness of messages but focused instead on identifying the messages that the campaign communicated from their actual content. For cases in which constructs of the same or similar name appeared in several theories, panelists assessed the construct and based their decisions on its definition on how it functioned within the theories. For theories, panelists determined if enough key constructs were applied. For example, if three of four constructs were applied but the missing construct was considered by the panelists to be essential, the theory was considered not observed. The panel viewed the campaign website together to review the campaign messaging and material, and then discussed each pending theory in alphabetical order. They agreed that if at least two of the three panel members supported a categorization after discussion, the panel would endorse that categorization as its final decision.

Expert Panel Classification of Campaigns by Theory

All 29 campaigns required discussion by the panel because there was disagreement among the panelists' independent reviews regarding the categorization of theories and constructs. On average, for each campaign, the panelists agreed for 11 (range=5 to 24 theories) of the theories in their independent reviews and needed to discuss the remaining 18 theories.

The panelists determined that, on average, 2 theories were applicable to (observed/displayed in) the content of the campaigns (range = 0–8 theories). Some theories were partially observed in campaigns as were several constructs. *Faces of Drunk Driving* had the most applied theories at eight (EPPM, HAPA, HBM, II, IMB, PMT, SCT, and SLT). The campaign material included videos that highlighted the severity of consequences and information that highlighted actions that could be taken to prevent impaired driving (e.g., benefits, barriers, cues). The panelists were concerned that there was an imbalance between the strength of the efficacy messaging and the severity messaging (that the level of fear presented outweighed the level of efficacy), but ultimately decided that the balance was close enough to consider these 8 theories applied. X the TXT had the fewest theories applied with 0 and only 1 construct applied (Behavioral Intentions). This campaign consisted of a Facebook page that included a pledge to not text while driving.

Table 3 provides counts of DDB and impaired-driving campaigns to which each theory and construct were observed. The IMB was observed in the most campaigns ($n=16$). It was originally used to describe HIV-related risk behaviors and suggests that information, motivation (personal and social), and behavioral (self-efficacy/confidence) skills predict risky behavior (Fisher & Fisher, 1992). In the literature review, evidence of this theory was found for other health-related behaviors but not for DDB or impaired driving. This theory also provided the most frequently applied construct, information, which was observed in 25 campaigns. In the campaigns considered, information was observed most often in the form of describing or defining the target behavior (e.g., distracted driving is anything that takes the driver's focus away from the roadway) and statistics about the prevalence of and consequences related to the target behavior. This observation of the construct is consistent with the earlier observation that information or statistics or both were components in 25 of the campaigns examined in the study. The other theories determined to be observed in the most campaigns were HBM ($n=15$), EPPM ($n=13$), deterrence theory ($n=12$), SLT ($n=12$), HAPA ($n=11$), SCT ($n=11$), and TIB ($n=10$). Several of the more frequently applied theories have constructs in common with one another. The terms used to describe the constructs may differ among theories, but the underlying meaning is often similar. For example, the idea behind the construct of information in the IMB is that the audience

needs to be presented with information about the behavior and the risks it poses, before becoming motivated to change. Many theories include the constructs of threat appraisal, risk perception, susceptibility, and/or severity, which implies having some information about the risky behavior of interest (e.g., EPPM, HAPA, and HBM). Many theories also include some notion of motivation as a precursor to behavior change (e.g., HAPA). What differs across these various theories is the extent to which these constructs are explored and the other factors that come into play.

Each theory was also given a rating based on how often the full theory, or some of its constructs, was observed in the traffic safety campaigns considered in this project. The rating for the theory was derived by assigning a score of 3 when the full theory was observed and a score of 1 when one or more constructs were observed but not the full theory. Theory scores were summed across campaigns and the percentage of points of the total possible number of points was used to determine cutoffs. The following cutoffs were used for assigning frequency of observation ratings: 30% or greater (high observation frequency; $n=12$); 15% to 30% (medium observation frequency; $n=2$); less than 15% (low observation frequency; $n=15$). The ratings for each theory are shown in Table 3.

Table 3. Number of campaigns for which theories and constructs were observed and the frequency of application rating (in alphabetical order by theory)

Theories	DDB campaigns (n=16)	Impaired driving campaigns (n=13)	Application frequency rating
Constructs			
Associative-Propositional Evaluation Model	0	0	Low
Explicit attitudes	1	0	
Implicit attitudes	0	1	
Propositional validation	1	0	
Association activation	1	0	
Automaticity Theory	0	0	Low
Priming	0	0	
Goals	0	0	
Deterrence Theory	7	5	High
Severity	11	8	
Certainty	7	5	
Celerity	6	5	
Elaboration Likelihood Model	4	1	Low
Peripheral route	3	1	
Central route	3	1	
Emotion Information Management	0	0	Low
Valence	1	5	
Recognition of emotions	0	0	
Regulation of emotions	0	0	
Empathy	4	5	
Attitude toward advertisement	0	0	

Theories	DDB campaigns (n=16)	Impaired driving campaigns (n=13)	Application frequency rating
Constructs			
Behavioral intentions	1	2	
Extended Parallel Process Model	8	5	High
Self-efficacy	2	4	
Response efficacy	8	5	
Susceptibility	8	6	
Severity	11	8	
Fuzzy-Trace Theory	0	0	Low
Verbatim representation	0	0	
Gist representation	0	0	
Health Action Process Approach	5	6	High
Risk perception	10	8	
Outcome expectancies	7	8	
Self-efficacy	0	3	
Action planning	6	10	
Coping planning	1	6	
Action	2	2	
Health Belief Model	9	6	High
Perceived severity	12	8	
Perceived susceptibility	10	7	
Perceived benefits	8	8	
Perceived barriers	2	4	
Modifying variables	4	2	
Cues to action	7	9	
Self-efficacy	2	3	
Implementation Intentions	3	5	High
Intention	6	8	
Plan of action	4	7	
When	4	7	
Where	4	6	
How	5	7	
Planning obstacles	1	5	
Information-Motivation-Behavioral Skills Model	8	8	High
Information	15	10	
Motivation	6	11	
Behavioral skills	7	8	
Precaution Adoption Process Model	0	0	Low
Unaware of issue	0	0	
Unengaged by issue	0	0	

Theories	DDB campaigns (n=16)	Impaired driving campaigns (n=13)	Application frequency rating
Constructs			
Deciding about acting	0	0	
Decided not to act	0	0	
Decided to act	0	0	
Acting	1	0	
Maintenance	0	0	
PRECEDE-PROCEED Model	0	0	Low
Predisposing factors	0	0	
Reinforcing factors	0	0	
Enabling factors	1	0	
Behavior	0	0	
Genetics	0	0	
Environment	0	0	
Health	0	0	
Quality of life	0	0	
Prospect Theory	0	1	Low
Risk manipulation	1	1	
Editing	0	0	
Evaluation	0	1	
Response mode	0	0	
Protection Motivation Theory	1	3	High
Threat appraisal	8	8	
Perceived severity	9	8	
Coping appraisal	1	5	
Response efficacy	6	5	
Self-efficacy	1	5	
Prototype Willingness Model	2	1	Medium
Attitudes	7	3	
Subjective norms	3	2	
Behavioral intentions	3	1	
Heuristic processing	0	1	
Risk prototypes	2	2	
Behavioral willingness	0	0	
Regulatory Fit Theory	0	0	Low
Regulatory focus	0	0	
Fit route	0	0	
Fit induction	0	0	
Contextual factors	0	0	
Evaluation	0	0	

Theories	DDB campaigns (n=16)	Impaired driving campaigns (n=13)	Application frequency rating
Constructs			
Behavioral intention	0	1	
Reinforcement Sensitivity Theory/Revised RST	0	0	Low
Behavioral activation	0	0	
Behavioral inhibition system	0	0	
Flight-fight system	0	0	
Extraversion	0	0	
Self-Determination Theory	2	0	Low
Mastery	2	0	
Autonomy	2	0	
Relatedness	1	1	
Social Cognitive Theory	4	7	High
Personal factors	5	7	
Environmental influences	4	7	
Behavioral determinants	3	7	
Social Judgment Theory	0	0	Low
Acceptance	0	0	
Non-commitment	0	0	
Rejection	0	0	
Social Learning Theory	4	8	High
Attention	8	11	
Retention	0	2	
Reproduction	0	6	
Motivation	4	8	
Social Norms Theory	0	0	Low
Misperception of norm	0	0	
Exposure to norm	0	0	
Theory of Bystander Intervention	2	4	Medium
Noticing	2	4	
Interpreting	1	4	
Responsibility	2	4	
Efficacy	0	4	
Intervening	3	4	
Theory of Interpersonal Behavior	4	6	High
Social factors	4	11	
Perceived consequences	10	9	
Intentions	4	5	
Affect	2	7	
Habits	3	0	

Theories	DDB campaigns (n=16)	Impaired driving campaigns (n=13)	Application frequency rating
Constructs			
Theory of Planned Behavior	2	5	High
Attitudes toward behavior	6	8	
Social norms	4	7	
Self-efficacy	1	4	
Technology inclination	1	0	
Anticipated guilt	3	7	
Empathic concern	3	5	
Self-esteem	2	5	
Theory of Reasoned Action	2	7	High
Attitudes	6	10	
Subjective norms	4	8	
Outcome expectancies	6	7	
Outcome valuations	2	6	
Theory of Self-Regulation	0	0	Low
Reference value	0	0	
Comparator	0	0	
Input function	0	0	
Output function	0	0	
Impact on environment	0	0	
Disturbance	0	0	
Transtheoretical Model/Stages of Change	0	0	Low
Pre-contemplation	0	0	
Contemplation	0	0	
Preparation	0	0	
Action	0	0	
Maintenance	0	0	
Termination	0	0	

The expert panel often noted that even when a theory was determined to be observed in a campaign, it was rare to have a single material or message from the campaign encompass enough constructs to reflect an entire theory. Most often, constructs were spread across material and the decision about whether a theory was applied depended on the constellation of material used. The panel often was not able to determine if and how material from the website were used or combined for delivery to audiences (i.e., which material audiences received or did not receive), so it was unclear if campaigns were using theory in practice. In a few cases, panelists saw several constructs as observed in a campaign but did not feel the constructs functioned together in the campaign the way the theory suggests, so they did not judge the theory as observed.

Use of Theories in Campaigns

This section presents, in alphabetical order, a summary of each theory, evidence supporting the utility of the theory for a behavior change campaign (from the literature review), and a summary of the expert panel's assessment of the frequency that each theory was applied to the campaigns examined in this study. (Frequency is operationalized in the paragraph before Table 3.) Refer to the letter report (Appendix A) for further discussion of these theories.

Associative-Propositional Evaluation Model (Frequency Rating: Low)

This theory is related to attitudes, and states that attitude change is caused by how people judge certain behaviors and that these judgments are based on two kinds of attitudes: implicit and explicit (Gawronski & Bodenhausen, 2006). Implicit attitudes can be directly changed in two ways: by conditioning people to react to something in a new way or by changing the context of the information so that a person can react to it in a different way. Explicit attitudes can be directly changed in three ways: by changing the relevant information regarding the behavior, by changing the automatic reactions and associations (association activation) that a person has toward a behavior, and by changing the judgments that a person has about a behavior to make him or her more logically consistent (propositional validation). While the literature review did not find evidence of this theory related to DDB or impaired driving, it was included in a technical manual recommending theories for traffic safety improvement campaigns (Delhomme et al., 2009). The theory constructs considered by the expert panel were explicit attitudes, implicit attitudes, propositional validation, and association activation.

The associative-propositional evaluation model was not directly observed in any campaigns considered in this study. However, some of the theory's constructs were identified as being applied to some of the campaigns. One campaign called *Phone in One Hand Ticket in the Other* (DDB) displayed propositional validation in the main slogan: if you use a phone then you will get a ticket. Another DDB campaign, *One Call Can Change Everything*, attempted to influence explicit attitudes through campaign messaging such as an infographic that stated, Myth #1: Drivers can multitask, that attempted to change drivers' perceptions of which DDB-related information they considered relevant. One impaired-driving campaign, *What Will YOU Lose?* displayed implicit attitudes in campaign messaging that attempted to implicitly link the desired behavior to outcomes that should be important to drivers. Finally, the construct of association activation was also observed in one DDB campaign (*One Text or Call Could Wreck It All*). In this case, the campaign was associating the well-known Stop Sign icon with the message to stop texting while driving.

Automaticity Theory (Frequency Rating: Low)

Automaticity is the ability to automatically perform a behavior or skill without needing to think about it. As described by Bargh and Chartrand (1999), AT is based on the premise that people can be consciously or unconsciously influenced, or primed, by people, places, and things around them to behave or think in certain ways. One can use priming to recall a person's stereotypes concerning other types of people, which can then influence the way that he or she interacts with people who evoke stereotypes and how he or she feels about those interactions. Situational context can also prime people to focus on a particular goal, which can lead to forming habits that unconsciously guide behavior in certain situations. The literature review included a review of documents that found evidence of how priming can affect risky driving behavior, including DDB

and impaired driving (Ben-Ari, 2012). Another document included in the literature review found that automaticity predicted the frequency of sending and receiving texts while driving among college students (Bayer & Campbell, 2012). The theory constructs considered by the expert panel were priming and goals.

AT or any of its constructs was not observed in any of the DDB or impaired-driving campaigns considered in this study. However, the research findings cited in the preceding paragraph suggest that automaticity theory is possibly observed in campaigns against DDB and impaired driving.

Deterrence Theory (Frequency Rating: High)

Deterrence theory (Beyleveld, 1979a, 1979b) is the basis of HVE approaches and focuses on three characteristics of consequences of infractions and on the perception of risk: certainty (consequences cannot be avoided), celerity (consequences will happen quickly), and severity (consequences will be sufficiently undesirable). While not included in the literature review, the theory was added to this study for consideration by the expert panel due to its association with HVE approaches. The theory constructs considered by the expert panel were certainty, severity, and celerity.

Deterrence theory was observed in 7 DDB campaigns (*Arrive Alive: Distracted, Just Drive [Put ur phone 2 bed], U Drive. U Text. U Pay., Phone in One Hand Ticket in the Other, Talk. Text. Crash., Focus O'on Driving, Not the Distractor!*, and *One Text or Call Could Wreck It All*) and 5 impaired-driving campaigns (*Think! Drink Driving, Sober or Slammer, Don't Risk It, Booze It & Lose It, and Drive Sober or Get Pulled Over*). Seven other campaigns used the severity construct of deterrence theory (4 DDB campaigns and 3 impaired-driving campaigns).

According to deterrence theory, behavior change results from appropriate changes in three components of perceived risk – severity ideally should be high, certainty should be high, and celerity should be immediate. The severity of consequences (e.g., crashes, tickets, impacts on families) is easily conveyed, which explains why so many campaigns have used this construct. Certainty is more difficult to convey. Drivers already know that they can drive distracted or impaired on some trips without receiving a ticket or getting in a crash. The key to conveying certainty is to try to increase people's perceived likelihood of these adverse consequences happening if they engage in the illegal behavior, rather than try to convince them that they will always get a ticket or crash. Finally, in terms of traffic safety, celerity is closely linked to the type of outcome. For tickets and crashes, the celerity is immediate – drivers get pulled over or in a crash when they are engaging in the behaviors. There are also secondary consequences that result from crashes or tickets that can be included in campaign messaging, such as litigation, that may occur many months after a crash or ticket, and in these cases, the celerity can be long.

Elaboration Likelihood Model (Frequency Rating: Low)

As described by Tam and Ho (2005), this model focuses on attitudes and persuasion, and explains how different ways of processing information can lead to attitude and behavior change. Within this model, there are two major routes to persuasion: the central route and the peripheral route. The peripheral route is used when a person is unable or unwilling to think more deeply about a message. This occurs because people cannot fully engage with every message that they encounter every day. The model proposes that the central route leads to longer lasting attitude and behavior change because it involves deeper thought and more engagement with the persuasive message. A study comparing positive emotional appeals and negative emotional

appeals in a campaign to prevent impaired driving found evidence of greater persuasiveness of negative appeals immediately after viewing the ad, but greater improvement of positive appeals over time (Lewis et al., 2008). The theory constructs considered by the expert panel were peripheral route and central route.

The ELM was observed in 4 DDB campaigns (*One Call Can Change Everything*, *Phone in One Hand Ticket in the Other*, *Remembering Ally*, and *U Drive. U Text. U Pay.*) and 1 impaired-driving campaign (*Drive Sober or Get Pulled Over*). Of the 5 campaigns to which ELM was observed, 3 displayed both central routes and peripheral routes. In the other 2 campaigns, peripheral route was observed by itself in one and central route by itself in the other. These constructs were not observed in any other campaigns, even in the absence of applying the overall theory.

Given the central route has a more enduring impact on behavior change than the peripheral route, applications of the ELM need to include this route to persuasion along with the peripheral route. This has been done in some distracted and impaired-driving prevention campaigns by ensuring a high level of message elaboration in which there is careful and thoughtful consideration of the merits of information provided, requiring central processing by the audience. The peripheral route has also been used by bringing in negative cues of crashes or tickets associated with the behavior of interest.

Emotion Information Management (Frequency Rating: Low)

As described by Taute et al. (2011), this theory is concerned with how people's ability to manage their emotions influences how they perceive emotional advertising, through three emotion management skills: recognition of emotions, regulation of emotional responses, and empathy. Advertisements can create positive and negative emotions in people viewing them, and how they manage those positive and negative emotions influences how much empathy they feel toward the advertisement, which then determines their attitudes and responses to the advertisement. The literature review included evidence of the efficacy of EIM for explaining how emotional appeals affect attitudes toward the advertisement and behavioral intentions to comply with both positive-focused and negative-focused impaired-driving commercials. Results showed that those who were able to better manage negative emotions were less affected by a negative campaign. The theory constructs considered by the expert panel were valence, recognition of emotions, regulation of emotions, empathy, attitude toward advertisement, and behavioral intentions.

While the theory of EIM was not observed in any of the campaigns examined in this study, the strategy of drawing on peoples' emotions as a method to connect with the audience and stimulate behavior change was widely observed. The constructs of empathy, valence, and behavioral intentions were applied in many campaigns. Empathy was the most observed construct from this theory, and was identified in 9 campaigns, particularly in those that presented emotional stories and videos of crashes, victims, and survivors. Examples of these types of campaigns included *Arrive Alive* (DDB), *One Call Can Change Everything* (DDB), and *Think! Drink Driving* (impaired driving). Valence was observed in 6 campaigns overall, with 5 of those focused on impaired driving. Of those, 4 campaigns displayed valence in conjunction with empathy. These were: *Faces of Drunk Driving*, *What Will YOU Lose?*, *Buzzed Driving Is Drunk Driving*, and *Booze It & Lose It*. These campaigns depicted negative consequences of impaired driving while using actual victims in the videos to elicit empathy from the audience. Behavioral intentions was

featured in one DDB campaign, X the TXT, and 2 impaired-driving campaigns, *Drive Sober or Get Pulled Over*, and *Arrive Alive Drive Sober*, primarily with pledges.

Extended Parallel Process Model (Frequency Rating: High)

As described by Witte and Allen (2000), the EPPM posits that a fear appeal initiates two appraisals by the recipient: (1) an assessment of the threat and (2) an appraisal of the efficacy of the recommended response. According to the theory, if people perceive the threat to be low, they will stop processing the message and ignore the fear appeal. If people perceive the threat to be serious and relevant, they will act by attempting to control the danger (high efficacy), the desired behavior, or control the fear (low efficacy). While the literature review did not find documents specifically relating this theory to DDB or impaired driving, it did reveal a meta-analysis of 93 studies on general fear appeals that found that strong fear appeals coupled with high-efficacy messages produce the greatest behavioral change. In other words, fear appeals appear to be a strong motivator if people believe that they can protect themselves. The theory constructs considered by the expert panel were susceptibility, severity, response efficacy, and self-efficacy.

The EPPM was observed in 8 DDB campaigns (*Arrive Alive: Distracted, It Can Wait, Just Drive [Put ur phone 2 bed], Phone in One Hand Ticket in the Other, Stop the Texts. Stop the Wrecks., Talk. Text. Crash., and U Drive. U Text. U Pay.*) and 5 impaired-driving campaigns (*Booze It & Lose It, Buzzed Driving Is Drunk Driving, Faces of Drunk Driving, Sober or Slammer, and Think! Drink Driving*).

The isolated campaigns included a fear appeal that communicated the potential severity of and susceptibility to consequences if a person engaged in DDB or impaired driving. Examples included the use of videos showing distracted drivers crashing, using statistics and images to depict the likelihood of crashes/fines as WHEN not IF (e.g., the message that if you use your phone, then you will get a ticket in the *Phone in One Hand Ticket in the Other* campaign), and portraying the consequences of crashes/fines as severe. The campaigns also included components to convince people that the target behaviors (avoiding DDB/impaired driving) will prevent negative outcomes (e.g., tickets, injuries, and crashes) and how to perform the target behavior. Examples included providing tips and strategies that present clear and achievable behavioral actions to avoid DDB/impaired driving and helping people start acting by making pledges to avoid those behaviors.

Campaigns must combine fear appeals (with susceptibility and severity included) and danger control messages (with response efficacy and self-efficacy included) to effectively apply this theory. This can be achieved by combining several components (e.g., public service announcements/videos, tip sheets, posters, and pledge cards) that individually do not encompass the entire theory but collectively do.

Several additional campaigns reflected some constructs in their messaging but not enough for the full theory to be evident. In most cases, the campaigns included fear appeals (susceptibility or severity or both), but no danger control messaging (response efficacy or self-efficacy or both). Four campaigns' messages only reflected severity: *One Call Can Change Everything* (DDB), *Zero Fatalities Distracted Driving* (DDB), *Don't Risk It* (impaired driving), and *What Will YOU Lose?* (impaired driving). One impaired-driving campaign reflected susceptibility and severity in their messaging (*Drive Sober or Get Pulled Over*). One DDB campaign's (*Put It Down. DNT TXT N DRV*) messages did reflect the needed combination of fear appeal (with severity) and

danger control (with response efficacy), but those message components were not strong enough to overcome the lack of susceptibility and self-efficacy. Notably, the campaign did not provide clear steps for avoiding texting while driving beyond the campaign tagline.

Fuzzy-Trace Theory (Frequency Rating: Low)

As described in Reyna (2012), FTT is a judgment and decision-making model that proposes that exposure to significant information records two types of memory in a person: a verbatim representation and a representation that is one or more gists (or the essential meanings of the information without specific details). When making decisions, people use both types of representation, and the two types of information might lead to ambivalence (competing decisions). Adolescents are more prone to analytical thinking where they evaluate the tradeoff between risks and benefits, and that produces verbatim representations. Adults tend to use an intuitive mode of thinking that result in gist memories and less risk-taking behavior. The theory also predicts that people tend to rely on gist, particularly as they develop more expertise on a topic. While the literature review did not reveal studies of this theory specifically related to DDB or impaired driving, it did include a literature review of 42 documents that applied FTT to decision making regarding health behaviors. Six studies in the review involved risky behaviors, including speeding, and found that gist-based reasoning was most often associated with risk-avoidance, while verbatim-based reasoning was associated with risk taking (Blalock & Reyna, 2016). The theory constructs considered by the expert panel were verbatim representation and gist representation.

The expert panel did not find that any of the DDB or impaired-driving campaigns considered in this study displayed FTT or either of its constructs. The theory is primarily concerned with judgment and decision-making based on how information is stored and accessed in memory.

Health Action Process Approach (Frequency Rating: High)

As described by Schwarzer (2008), this theory has two phases, or stages, that people go through when experiencing behavior change: motivational and volitional. The theory was developed to help explain how people move from just intending to perform a behavior to doing the intended behavior. Action self-efficacy, outcome expectancies, and risk perception are part of the process that leads to a behavioral intention. Then, action planning, coping planning, and maintenance self-efficacy form the process that moves people from a behavioral intention to performing the behavior. Finally, once people begin performing a behavior, they enter an action stage made up of three constructs (initiative, maintenance, recovery) that they cycle through when trying to stick to a habit. A third type of self-efficacy, recovery self-efficacy, also influences people's ability to maintain a new behavior. Self-efficacy, a person's confidence in his or her ability to do something, is broken down into three types in this model because each phase of behavior change carries with it different types of challenges. The literature review did not reveal documents providing specific evidence that this theory predicts DDB or impaired driving, but the search did provide evidence that it applied to seat belt use (Schwarzer et al., 2007). The theory constructs considered by the expert panel were – in the motivational phase: risk perception, outcome expectancies; in the volitional phase: action planning, coping planning, action (initiative, maintenance, recovery); and self-efficacy (action, maintenance, recovery).

The HAPA was observed in a total of 11 campaigns examined in this study, including 5 for DDB (*It Can Wait, Just Drive [Put Ur Phone 2 Bed]*, *One Text or Call Could Wreck It All*, *Remembering Ally*, *Zero Fatalities*) and 6 for impaired driving (*Faces of Drunk Driving*, *Think! Drink Driving*, *Sober or Slammer*, *Don't Risk It*, *Buzzed Driving Is Drunk Driving*, *Booze It & Lose It*). The campaigns that displayed this theory incorporated most of its constructs; however, recovery was absent from all campaigns. This theory starts in the motivational phase, with risk perception, and this was presented in all campaigns using the HAPA by communicating the risks and consequences of DDB and impaired driving. Several campaigns offered concrete strategies to impact behavior change by addressing self-efficacy, such as advice and strategies to aid with the process of behavior change. An example of action planning in at least 2 campaigns was taking a pledge to not text and drive. Coping planning was observed in videos and suggestions that addressed barriers to behavior change, while self-efficacy was increased by providing explicit strategies to perform the behavior. An example of this was found in the distracted driving campaign *Remembering Ally* where the website includes a list of barriers and strategies for overcoming the barriers to distracted driving. One item on this list was: Speak up about your driving and let others know that you are not or will no longer be a distracted driver.

Other campaigns did not display enough constructs from the HAPA to warrant application of the entire theory. However, the HAPA constructs were observed either individually or with select others in an additional 10 campaigns (5 DDB campaigns and 5 impaired-driving campaigns). Risk perception was most observed across the examined campaigns.

As noted earlier, the HAPA is a model of behavior change that accounts for different stages of change including developing a behavioral intention, acting on that intention, and maintaining the behavior. To effectively apply this theory in DDB and impaired-driving campaigns, it is important that messaging and material span the entire interval from developing a behavioral intention through maintaining that behavior. Consideration should be given to how to present the risk of engaging or not engaging in a behavior, such as texting and driving, keeping in mind that fear appeals should also be coupled with information to promote self-efficacy and action planning. It is also critical to provide explicit strategies and practical advice for how to perform/avoid the target behavior as well as how to overcome barriers to changing or maintaining behavior change.

Health Belief Model (Frequency Rating: High)

According to the HBM (Rosenstock, 1974), the likelihood of a behavioral outcome is predicted by the individual's assessment of susceptibility to and the severity of consequences of the behavior, benefits of taking action, ability to take action, barriers to taking action, cues to take action, and additional modifying factors among those constructs (e.g., age, race, psychosocial variables). The literature review revealed evidence for this theory related to DDB (Beck & Watters, 2016; Knowlden & Sharma, 2012), impaired driving and speeding (Fernandes et al., 2010). The theory constructs considered by the expert panel were perceived severity, perceived susceptibility, perceived benefits, perceived barriers, self-efficacy, cues to action, and modifying variables.

The HBM was applied in 15 campaigns in this study, including 9 DDB campaigns (*Arrive Alive: Distracted*, *Focus On Driving*, *Not the Distractor!*, *It Can Wait, Just Drive [Put Ur Phone 2 Bed]*, *One Text or Call Could Wreck It All*, *Phone in One Hand Ticket in the Other*, *Put It Down*, *DNT TXT N DRV*, *Stop the Texts*, *Stop the Wrecks*, and *U Drive. U Text. U Pay.*) and 6 impaired-

driving campaigns (*Booze It & Lose It*, *Buzzed Driving Is Drunk Driving*, *Drive Sober or Get Pulled Over*, *Faces of Drunk Driving*, *Sober or Slammer*, and *Think! Drink Driving*). The messaging and material from these campaigns encompass most, if not all, constructs of the HMB. For example, cues to action are considered prompts to engage in the goal behavior. In the campaigns examined, examples of cues to action included taking a pledge to not use a cell phone while driving and videos of surviving family members of those that were killed because of distracted driving, such as in *It Can Wait*. These types of videos also address other constructs such as perceived severity, perceived susceptibility, and perceived benefits to avoiding the behavior and its negative outcomes, as well as concrete strategies for avoiding the behavior, such as putting your cell phone on the do-not-disturb function.

In addition to the campaigns that displayed the full theory, 10 additional campaigns displayed individual constructs or a set of constructs. Perceived susceptibility and perceived severity were most common, followed by perceived benefits and cues to action. The HBM is a relatively simple model of behavior change in terms of the number and complexity of its constructs. This, in part, may have led to the frequency of which this theory was employed in its entirety in this study. Like the use of other theories in this project, using a host of material targeting each of the constructs will allow for adequate consideration of each construct in the messaging of traffic safety campaigns. For instance, two ways in which an impaired-driving campaign could use constructs of the HBM are by using posters to communicate the perceived threat of drunk driving and using videos showing different methods for avoiding drunk driving. Focusing on increasing one's self-efficacy in avoiding a risky behavior was also another important feature to any campaign using HMB.

Implementation Intentions (Frequency Rating: High)

As described by Simpriano et al. (2015), II explains how people move from a behavioral intention to performing the behavior. It suggests that people create a strategy in the form of I intend to do X at time and place Y. Specific plans lead to a greater likelihood of behavior change because having specific details about time and place helps to overcome obstacles associated with changing behavior. The literature review did not reveal documents providing specific evidence of how well this theory predicts change in DDB or impaired driving, but the search did include a review of documents about theories that underlie successful health behavior interventions that cited evidence of II in campaigns related to sexual behavior, eating habits, exercise, and medication adherence (Baban & Craciun, 2007). The theory constructs considered by the expert panel were intention, plan of action, when, where, how, and planning obstacles.

II was observed in 3 DDB campaigns (*It Can Wait*, *Remembering Ally*, and *Think! Mobile Phones*) and 5 driving impaired-driving campaigns (*Arrive Alive: Drive Sober, Don't Risk It*, *ENDWI³ Buzzkill*, *Faces of Drunk Driving*, and *Plan2Live*). Most of these campaigns either displayed the full set of theory constructs (intention, plan of action, when/where/how, and planning obstacles), or displayed all but the construct of planning obstacles.

Several additional campaigns displayed some of the constructs of the theory without applying the overall theory. Specifically, the intention construct was observed in 3 DDB and 3 impaired-driving campaigns. The plan of action construct was observed in 1 DDB campaign and 2 impaired-driving campaigns. At least one component of the when/where/how construct was

³ ENDWI is the New Mexico campaign contraction of End DWI.

observed in 2 DDB campaigns and 2 impaired-driving campaigns. The planning obstacles construct was only observed in one impaired-driving campaign in the absence of the overall theory.

The focus of II is on how intention can be translated into behavior through a series of concrete, well thought out steps. To effectively apply this theory to DDB and impaired-driving campaigns, it is important to provide clear guidelines and tools for managing each step. For example, one strategy for getting people to develop an intention to use their seat belt is to get them to sign a pledge. Campaigns using this strategy should provide practical advice on how to go about this. Similarly, messaging around the development of action plans should include specific tips or strategies and attach actions to a timeline and context to help the audience address the when/where/how step in the theory. Identifying potential obstacles is also important so that advice can be provided about how to overcome them.

Information-Motivation-Behavioral Skills Model (Frequency Rating: High)

The IMB (Fisher & Fisher, 1992) was originally used to describe HIV-related risk behaviors and suggests that the combination of information, motivation, and behavioral skills predict behavior. The literature review revealed limited support for this theory related to high-risk sexual behavior (Kalichman et al., 2008) and no documents related to DDB or impaired driving. The theory constructs considered by the expert panel were information, motivation, and behavioral skills.

Despite the lack of evidence for this theory related to DDB and impaired driving in the literature, it received the highest score of all theories examined in this study and was observed in 16 of the 29 campaigns examined: 8 DDB campaigns (*Arrive Alive: Distracted, It Can Wait, Just Drive [Put ur phone 2 bed], One Text or Call Could Wreck It All, Remembering Ally, Stop the Texts. Stop the Wrecks, Think! Mobile Phones, and U Drive. U Text. U Pay.*) and 8 impaired-driving campaigns (*Booze It & Lose It, Buzzed Driving Is Drunk Driving, Don't Risk It, ENDWI Buzzkill, Faces of Drunk Driving, Plan2Live, Sober or Slammer, and Think! Drink Driving.*). Five of the distracted driving campaigns that displayed the IMB displayed all three of its constructs; however, the construct of motivation was missing from *Just Drive* and *Remembering Ally*, and the construct of behavioral skills was missing from *U Drive. U Text. U Pay*. All the impaired-driving campaigns that displayed the IMB displayed all of its constructs, except for the *Buzzed Driving Is Drunk Driving* campaign, which did not include behavioral skills.

Overall, an additional 12 campaigns displayed constructs from the IMB without using the full theory. In almost every case, the construct observed was that of information. Application of the IMB should include all three constructs of information, motivation, and behavioral skills. The information provided about the behavior of interest should be factual and can include statistics on adverse outcomes associated with the behavior. Messages to motivate the audience to engage in the behavior can be strengthened using stories and testimonials by significant others. Such testimonials can be used to encourage audience members to make their own pledge to change their behavior. The construct of behavioral skills is often the most challenging to successfully incorporate into campaigns. It is not enough just to speak generally about what should be done. Campaign material should provide clear modeling of the skills needed for the behavior of interest. For example, a campaign to reduce impaired driving might provide tip sheets and modeling of how to ask someone for a ride home if a person has been drinking.

Precaution Adoption Process Model (Frequency Rating: Low)

As described in Baban and Craciun (2007), the PAM is a model of behavior change proposing that behavior change occurs during seven stages:

1. people are unaware of the behavior;
2. people are aware of the behavior but do not care about it;
3. people care about the behavior, but are still deciding whether to act to change the behavior;
4. people decide not to act to change the behavior;
5. people decide to act to change the behavior;
6. people change their behavior, they have begun performing the desired behavior; and
7. people continue performing the behavior, it is maintained.

While the literature review did not yield evidence of this theory related to DDB or impaired driving, it did find a review of 8 theories that predict successful health behavior interventions including support for this theory relative to exercise behavior. The theory constructs considered by the expert panel were unaware of issue, unengaged by issue, deciding about acting, decided not to act, decided to act, acting, and maintenance.

None of the DDB or impaired-driving campaigns considered in this study displayed the PAM (Baban & Craciun, 2007). A single construct, Stage 6 (deciding to act to change behavior), was displayed in 1 DDB campaign (*Think! Mobile Phones*). While this theory is most often used in health counseling and personalized interventions, the expert panel recognized the potential to use the theory to develop campaign messages for target audiences at the various stages of behavior.

PRECEDE-PROCEED Model (Frequency Rating: Low)

The main purpose of this model is to provide a structure for applying theories and concepts systematically for planning and evaluating health behavior change programs. Overall, four planning stages, one implementation phase, and three evaluation phases, make up the entire model (Gielen et al., 2008). PROCEED was added to the PRECEDE framework in 1991. While the literature review did not reveal evidence that this theory predicts DDB or impaired driving, it did include an evaluation of a community education campaign to increase booster seat use based on the PPM. The evaluation found a significant increase in booster seat use in the intervention communities (Ebel et al., 2003). The theory constructs considered by the expert panel were predisposing factors, reinforcing factors, enabling factors, behavior, genetics, environment, health, and quality of life.

The PPM was not directly observed in any traffic safety campaign considered in this study. However, one construct was identified as observed in 1 DDB campaign. The construct of enabling factors was identified for the *End Text Wrecks. Dance The Wookie* campaign because the campaign attempted to motivate behavior through challenges from others to pledge to not text while driving. Through that messaging, the campaign attempted to create an environment that enabled drivers to avoid texting.

Prospect Theory (Frequency Rating: Low)

Prospect theory seeks to explain how people make decisions under risk and uncertainty from a cost-and-benefit perspective (Kahneman & Tversky, 1979). According to this model, people make decisions based on expected gains and losses relative to a mental rule called a reference

point, a construct related to risk perception that varies with context and that communication campaigns can address. Decisions result from a two-stage process: (1) people consider possible outcomes, the outcomes are compared to their reference point (i.e. the point at which outcomes are considered equal in value), and outcomes below the reference point are losses while those above the reference point are gains; and (2) people behave as though they were making a mental calculation that sums those losses and gains while also considering the probability of an outcome. A person's reference point can become biased and it can be manipulated through various framing effects such as editing (people put higher value on certain outcomes over probable outcomes, even if the probable outcome has more gains), evaluation (people are risk averse when considering gains but willing to accept more risk when considering potential losses), and response mode (when making a choice between several alternatives, people tend to ignore what the alternatives have in common and focus on how they differ). This can be irrational if a person is making a series of decisions but is ignoring the fact that decisions made going forward are still based on the results of the decisions that have been made so far. While the literature review did not find studies of this theory in relation to DDB or impaired driving, it did identify a meta-analysis of 136 studies that supported general framing effects and found risk manipulation especially important (Kühberger, 1998). The theory constructs considered by the expert panel were risk manipulation, editing, evaluation, and response mode.

PT was applied in 1 impaired-driving campaign, *Think! Drink Driving*. Additionally, the construct of risk manipulation was observed in 1 DDB campaign, *Think! Mobile Phones*. The related construct of risk perception was observed in many campaigns. There may be some benefit to using PT in creating effective traffic safety campaigns, but it should be used in its entirety rather than selecting only certain constructs. This can be achieved by combining several messaging components (e.g., videos, logos, posters) that separately focus on individual constructs, but collectively incorporate the entire theory. Messaging material should clearly model the process of considering possible outcomes of the behavior, subsequently selecting a reference point to judge gains or losses of the outcomes of the behavior, and then comparing the sum value of the gains and losses to make a decision.

Protection Motivation Theory (Frequency Rating: High)

PMT (Rippetoe & Rogers, 1987) provides an understanding of the use of fear appeals in messaging. It posits that people base decisions to protect themselves from health threats on four factors: perceived severity of the threat, perceived probability that the threat will occur, the effectiveness of the target behavior to avoid the threat, and self-efficacy to complete the target behavior. The literature review did not reveal documents providing specific evidence about the application of this theory related to DDB or impaired driving, but the search did include a meta-analysis of research on PMT that included 65 studies representing over 20 health-related behaviors such as smoking cessation, sunscreen use, and exercise (Floyd et al., 2000). The mean overall effect size was of moderate magnitude, with increases in threat severity, threat vulnerability, response efficacy, and self-efficacy generally shown to facilitate adaptive intentions or behaviors. The theory constructs considered by the expert panel were threat appraisal, perceived severity, coping appraisal, response efficacy, and self-efficacy.

PMT was observed in 1 DDB campaign (*Arrive Alive: Distracted*) and 3 impaired-driving campaigns (*Faces of Drunk Driving*, *Think! Drink Driving*, *Booze It & Lose It*). Information and media provided in these campaigns highlighted the adverse outcomes related to the risky

behavior, the costs and rewards of avoiding the behavior, the effectiveness of a preventive behavior in avoiding a negative outcome, and information about actions that can be taken to complete the preventive behavior. Several additional campaigns reflected some constructs in their messaging but not enough for the full theory to be evident. Threat appraisal and perceived severity (7 DDB campaigns and 5 impaired-driving campaigns), and response efficacy (5 DDB campaigns and 2 impaired-driving campaigns) were found among the DDB and impaired-driving campaigns examined.

PMT may be useful in traffic safety messaging if all necessary components are present. Fear appeals coupled with danger control messages enable the target audience to not only understand the probability the threat will occur and the negative consequences of the threat, but also know how to protect themselves from adverse consequences of the threat. Fear appeals (threat appraisal and perceived severity) were provided in many campaigns, but the campaigns did not provide the audience with adequate information about how to avoid the threat (response efficacy or self-efficacy or both). Presenting concrete examples of actions to take to avoid the threat (e.g., having a designated driver or storing your cell phone in the glove compartment) is a critical component of this theory, and this should be reflected in campaign messaging.

Prototype Willingness Model (Frequency Rating: Medium)

As described by Gerrard et al. (2008), this model proposes that health risk behavior is volitional (i.e., by choice), but not necessarily planned. That is, rather than being premeditated or reasoned, behavioral choices can result from reactions to the conditions that are present with a particular health risk (i.e., triggers). The PWM was developed to help understand the risky health behaviors of adolescents. There are two main decision-making processes within the model: analytical processing (a logical process involving attitudes, SN, and behavioral intention) and heuristic processing (a process involving social reactions that involves risk prototypes and behavioral willingness). The literature review revealed evidence in support of this theory related to impaired driving (Rivis et al., 2011). The theory constructs considered by the expert panel were attitudes, SN, behavioral intentions, heuristic processing, risk prototypes, and behavioral willingness.

The PWM was applied in 2 DDB campaigns (*It Can Wait* and *One Text or Call Could Wreck It All*) and one impaired-driving campaign (*Drive Sober or Get Pulled Over*). However, none of these 3 campaigns included the full set of theory constructs; behavioral willingness was absent from all 3, heuristic process was absent from both of the DDB campaigns, attitudes was absent from 1 of the DDB campaigns, and behavioral intentions was absent from the impaired-driving campaign.

Several constructs from the PWM were observed in various campaigns in the absence of the overall theory. Constructs noted included attitudes (6 DDB campaigns and 2 impaired-driving campaigns), SN (1 DDB campaign and 1 impaired-driving campaign), behavioral intentions (1 DDB campaign and 1 impaired-driving campaign), and risk prototypes (1 impaired-driving campaign). The constructs of heuristic processing and behavioral willingness were not observed in any campaign in the absence of overall theory.

The application of the analytical processing component of the PWM appears more straightforward than the heuristic processing component. For example, campaigns addressing analytical processing often attempt to influence attitudes toward the behavior of interest (e.g., texting while driving), convey the risks of engaging in the behavior, and use SN to encourage the

audience to develop a behavioral intention to do or not do the behavior (e.g., by taking a pledge to not text and drive). However, given the theory's original focus on adolescent behavior, the heuristic processing component needs to be more fully applied in campaigns targeted to this segment of the population. Behavioral willingness and risky prototypes need to be addressed. One promising approach for achieving the latter is to present the audience with negative images of others who engage in the targeted risky behavior.

Regulatory Fit Theory (Frequency Rating: Low)

RFT is a goal attainment theory that suggests that goal pursuit is strengthened when it aligns with a person's values and beliefs (Higgins, 2005). This theory posits that people have different emphases when pursuing goals—one can be a promotion focus where goals are represented as aspirations or hopes or both and the other is a prevention focus where people represent goals as duties or obligations or both. When people pursue goals using strategies that align with their focus (eagerness for a promotion focus and vigilance for a prevention focus), they experience regulatory fit, which makes people more motivated to pursue the goal. When a goal matches a person's strategy, that increases fit, and when a strategy does not match with a person's focus, then that decreases fit. The theory describes many factors that influence a person's regulatory fit toward a goal, such as the person's regulatory focus, how the message attempts to deliver the regulatory fit, the way in which the fit is created, and contextual factors regarding where the fit is created.

While the literature review did not find studies of how RFT predicts DDB or impaired driving, it did include a meta-analysis of 215 studies that examined the theory within the context of peoples' evaluations, behavioral intentions, and behaviors in areas including persuasion, consumer purchasing behavior, social policy issues, and health issues (Motyka et al., 2014). Results indicated that the regulatory fit construct was robust and equally affected evaluation, behavioral intention, and behavior. Behavior depended on the level of control, whether real or perceived, as well as on the influence of situational elements on the individual. The theory constructs considered by the expert panel were – regulatory focus (promotion focus, prevention focus, source of focus); fit route (route, involvement); fit induction (creation, construction, scope); contextual factors (demographics, environment); evaluation (how much a person likes or dislikes something); and behavioral intention (how much a person wants to do a certain behavior).

None of the DDB or impaired-driving campaigns considered in this study displayed RFT. One construct, behavioral intention, was observed in the impaired-driving campaign, *Safe Sober Prom Night*.

Reinforcement Sensitivity Theory/Revised Reinforcement Sensitivity Theory (Frequency Rating: Low)

The RST/r-RST is a biological model of individual differences in motivation (Corr, 2004). Three brain-behavior systems are said to underlie individual differences in sensitivity to rewards and punishments: a behavioral activation system, a behavioral inhibition system, and a fight-flight-freeze system. The model also considers the role of personality traits (extraversion and neuroticism) in the reaction to rewards and punishments. The literature review included documents that used this theory to examine risky driving, including impaired driving, and found that theory constructs predicted perceived risk and self-reported risky behavior (Harbeck &

Glendon, 2013). Another study included in the literature review used this theory to examine speeding and found that both the BAS and the fight-flight-freeze system traits influenced message processing and effectiveness (Kaye et al., 2013). The theory constructs considered by the expert panel were behavioral activation, BIS, flight-fight system, and extraversion.

The expert panel did not find any DDB or impaired-driving campaigns considered in this study that displayed the RST/r-RST or its constructs. However, the research findings cited in the preceding paragraph suggest that automaticity theory is potentially useful in impaired-driving campaigns.

Self-Determination Theory (Frequency Rating: Low)

SDT focuses on how to get people to increase their self-motivation. According to the theory, self-motivation/self-determination is influenced by the ability or need or both to control outcomes (mastery); the need to be the agent of change in one's own life (autonomy); and the need to be connected to others (relatedness; Ryan & Deci, 2000). The extent to which the three needs are met determines how motivated a person is to act. The ability to sustain motivation varies according to how much control people believe they have over the target behaviors. While the literature review did not find evidence of this theory related to DDB or impaired driving, it did identify a meta-analysis of 184 independent data sets that found that the constructs of practitioner support for patient autonomy and patients' experiences of psychological need satisfaction were related to beneficial health outcomes (Ng et al., 2012). The theory constructs considered by the expert panel were mastery, autonomy, and relatedness.

SDT was applied in 2 DDB campaigns (*It Can Wait* and *Talk. Text. Crash.*). One additional impaired-driving campaign (*Buzzed Driving Is Drunk Driving*) displayed the construct of relatedness.

According to this theory, mastery, autonomy, and relatedness combine to create motivation for behavior. Therefore, evidence of all three in a campaign was needed to consider SDT observed in a campaign. The *It Can Wait* campaign consisted primarily of encouraging drivers to make a pledge to avoid distractions while driving. The campaign messaging included examples (via social media and the campaign website) of pledges that demonstrated pro-active action, relatedness to other drivers, relatedness to loved ones, and a strong sense that pledging was free-willed. While autonomy was observed in this campaign, it was often absent in similar campaigns that instead used pressure or shame or both to motivate audiences to make pledges. The *Talk. Text. Crash.* campaign demonstrated SDT constructs of mastery and autonomy via messages on billboards and in videos (Don't let your phone drive you and Under the influence of your phone). Those messages were the only part of the campaign where SDT was observed. The construct of relatedness was observed in the *Buzzed Driving Is Drunk Driving* campaign that included messages about the impact of impaired driving on others.

Social Cognitive Theory (Frequency Rating: High)

SCT (Bandura, 2011) focuses on how people develop new behaviors and gain new knowledge. The theory proposes three factors that work over time, and influence each other, to guide behavior change: personal determinants, behavioral determinants, and environmental determinants. Once a person is motivated to change, whether through a physical need such as hunger or pain, or a cognitive desire, such as imaginable outcomes of goals, then behavioral determinants determine what actions are available for that person to undertake, and self-efficacy

determines a person's belief that he or she can successfully engage in the behavior. The theory posits that people learn behaviors in part through modeling, or observational learning. The literature review did not include evidence of this theory applied to DDB or impaired driving but did include evidence of its application to a campaign to reduce speeding (Scott-Parker et al., 2013). The theory constructs considered by the expert panel were personal factors, environmental influences, and behavioral determinants.

SCT was observed in 4 DDB campaigns (*It Can Wait*, *Just Drive [Put ur phone 2 bed]*, *Stop the Texts*, *Stop the Wrecks*, and *U Drive. U Text. U Pay.*) and 7 impaired-driving campaigns (*15 Minutes*, *Booze It & Lose It*, *Don't Risk It*, *Faces of Drunk Driving*, *Plan2Live*, *Sober or Slammer*, and *Think! Drink Driving*). Every impaired-driving campaign that displayed SCT incorporated all three types of determinants (personal, behavioral, and environmental). Of the 4 DDB campaigns using this theory, personal determinants were absent from *Just Drive (Put ur phone 2 bed)* and behavioral determinants were absent from *It Can Wait*. Personal determinants were included in 2 DDB campaigns in the absence of the overall theory.

The concept of modeling is central to SCT; like SLT, this theory suggests that behavior results from the observation of others who are termed models. Therefore, modeling should be a key part of campaigns that use SCT. For example, in campaigns that promote the use of pledges to encourage safe behaviors such as seat belt use, it can be useful to mention others who have taken a similar pledge. These others represent models of desired behavior. While such modeling is generally in the form of showing the "right" behavior, modeling can also be in the form of showing the consequences of the wrong behavior (e.g., getting into a crash because of texting while driving). One way to strengthen the value of modeling is to also emphasize the obvious reward that can come from engaging in safe behavior or avoiding unsafe behavior (e.g., arriving safely at one's destination). In encouraging the audience to reproduce a model's behavior, it is important for the campaign to address the interactive roles of personal determinants (efficacy), behavioral determinants (responses to the behavior), and environmental determinants (conditions or settings that facilitate the behavior).

Social Judgment Theory (Frequency Rating: Low)

Social judgment theory proposes that the effect of a persuasive message on a person's attitude toward a behavior depends on how that person evaluates the message (Sherif et al., 1965). According to the theory, when people receive a persuasive message whether or not the message leads to behavior change depends on the person's most preferred position (called his or her anchor point); the person's judgment of three alternatives or latitudes for the message (acceptance, rejection, or non-commitment); and the person's level of ego-involvement with the issue. If a message falls within a range of ideas that a person objects to, the message is more likely to be rejected. Similarly, if a message falls within a range of ideas that a person finds agreeable, the message is more likely to be accepted. However, even when a message is rejected or accepted, if the message is too similar to the person's current attitude, it is not likely to persuade the person to change his or her attitude or behavior. Therefore, the most persuasive messages would fall within a person's latitude of non-commitment, where the person may moderately disagree with the message, but the message is neither so different from the person's current attitude that the message is rejected nor so similar that it does not suggest the need for attitude change. This theory could be used in the design of campaigns to determine the latitudes of acceptance, rejection, and non-commitment for audiences to ensure that messages targeted to

them are persuasive and credible. The number, size, and location of those latitudes with respect to the person's current attitude depend on how strongly the person holds his or her current attitude. When a person is persuaded by a message and integrates it into his or her own attitude, the latitudes change to reflect that message. While the literature review did not find studies indicating that this theory was used in DDB or impaired-driving campaigns, it did identify documents evaluating a campaign to reduce risky drinking behavior. The study results provided evidence for the importance of using this theory in the development of campaign material and for using an iterative process to ensure that the audience accepts the messages (Smith et al., 2006). The theory constructs considered by the expert panel were acceptance, non-commitment, and rejection.

The expert panel did not find any DDB or impaired-driving campaigns considered in this study that displayed the social judgment theory or any of its constructs.

Social Learning Theory (Frequency Rating: High)

According to SLT (Bandura, 1972), people learn through observation of other people's behavior, attitudes, and behavioral outcomes. For social learning to occur, people must notice the target behavior by others, remember what they noticed, be motivated to perform the target behavior themselves, and have the ability to perform the target behavior. The literature review did not reveal documents providing specific evidence that this theory applies to campaigns to prevent DDB or impaired driving, but the search did include a review document about theory use in social marketing interventions that cited evidence of SLT in campaigns related to nutrition and heart disease (Luca & Suggs, 2013). The theory constructs considered by the expert panel were attention to the modeled behavior, retention of the modeled behavior in memory, motivation to reproduce the modeled behavior, and actual reproduction of the behavior.

SLT was applied in 4 DDB campaigns (*Just Drive [Put ur phone 2 bed]*, *U Drive. U Text. U Pay.*, *Stop the Texts. Stop the Wrecks*, and *One Text or Call Could Wreck It All*) and 8 impaired-driving campaigns (*Faces of Drunk Driving*, *Think! Drink Driving*, *Sober or Slammer*, *Don't Risk It*, *15 Minutes*, *Booze It & Lose It*, *Drive Sober or Get Pulled Over*, and *Plan2Live*).

Whether the target was DDB or impaired driving, most of the campaigns to which SLT was observed included a combination of messaging and videos. In many, fear appeals and social sanction/influence provided the constructs of attention and motivation. Modeling of the target behavior (most often in videos) provided retention and reproduction. In almost every case, the expert panel felt that attention and motivation were strongly conveyed in the campaigns. Retention and reproduction were more challenging to determine solely from campaign components and without feedback from audiences about how (and if) the messaging was received and used. However, the expert panel felt that by using videos and other components that modeled or provided examples of the target behavior to audiences, the campaigns were at least attempting to help audiences retain and reproduce the target behaviors. For example, the *Texting and Driving – Manifesto* video in the *U Drive. U Text. U Pay.* campaign presented modeling and behavioral outcomes. The expert panel considered inclusion of modeling to be very important and this construct was what separated these campaigns from those in which some constructs, but not the full theory was observed.

Several campaigns included some of the SLT constructs but not enough for the theory to be considerable applied. Constructs observed included attention (often via fear appeal; 4 DDB

campaigns and 4 impaired-driving campaigns), retention (1 impaired-driving campaign), and motivation (2 impaired-driving campaigns).

Social Norms Theory (Frequency Rating: Low)

SNT posits that people's behaviors are influenced by beliefs regarding how much their peers accept and engage in those behaviors, even though those beliefs are often inaccurate (Perkins, 2003). People believe that others accept and engage in unhealthy behaviors more than they actually do. These beliefs can then lead them to engage in unhealthy behaviors, but if the beliefs are corrected, they can become more likely to resist the unhealthy behaviors. Also, once a person understands that others do not accept the unhealthy behaviors as previously believed, the person will feel more social support for healthy behaviors and engage in those more often. While the literature review did not reveal documents providing specific evidence that this theory predicts DDB or impaired driving, it was identified in one technical report as a behavior change theory to consider for traffic safety improvement campaigns (Robertson & Pashley, 2015). Specifically, the authors suggested that developing a campaign aimed to change how the audience perceives others' acceptance could be an effective strategy to change behavior. The theory constructs considered by the expert panel were misperception of normative beliefs (false consensus, false uniqueness) and exposure to normative beliefs.

The expert panel found that none of the DDB or impaired-driving campaigns considered in this study displayed SNT or any of its constructs. However, understanding the type of misperception attributed to a population can be important to developing effective interventions.

Theory of Bystander Intervention (Frequency Rating: Medium)

According to the TBI (Darley & Latane, 1968), bystanders go through five stages of processing before they intervene in a possibly dangerous situation. First, they must notice a dangerous situation (noticing). Second, they must interpret the situation as an emergency (interpreting). Third, they must take personal responsibility for the situation (responsibility). Fourth, they must believe that they have the ability to succeed in intervening (efficacy). Fifth, they must decide to help (intervening). There are three psychological processes that act as obstacles to this five-step sequence: diffusion of responsibility (when there are more bystanders in a group, people tend to take less personal responsibility for a situation and bystanders will feel less responsible for the outcome of a situation proportional to how many bystanders are in a group), evaluation apprehension (when others are watching, people feel more self-conscious of their actions and are more afraid of making mistakes and being harshly judged by others), and pluralistic ignorance (people tend to rely on other people's reactions to figure out how they should react to a situation – if no one else is acting like there is an emergency and that something needs to be done, then others are more likely to assume the same). The literature review included a review document showing evidence for the importance of recognizing danger, responsibility, efficacy, and action for explaining intervening in impaired driving (Buckley et al., 2016). The theory constructs considered by the expert panel were noticing, interpreting, responsibility, efficacy, and intervening.

The TBI was observed in 2 DDB campaigns (*Remembering Ally* and *Stop the Texts. Stop the Wrecks*) and 4 impaired-driving campaigns (*Drive Sober or Get Pulled Over*, *ENDWI Buzzkill*, *Sober or Slammer*, and *Think! Drink Driving*). All the campaigns that displayed the theory incorporated all or most of the five stages into their messaging. Efficacy was absent from both

DDB campaigns (with interpreting also absent from one of them). Only one impaired-driving campaign that the TBI applied to did not incorporate all constructs; noticing and interpreting were both absent from *Think! Drink Driving*. However, these two constructs were observed independent of the overall theory in 1 impaired-driving campaign (15 minutes). Finally, one DDB campaign (*One Call Can Change Everything*) displayed a single construct (intervening) but not the overall theory.

Getting people to intervene is a complex process and campaign messaging needs to focus on more than just the final stage of intervening in a situation (e.g., just telling people that they should intervene). In the case of a campaign directed at stopping texting and driving for example, messages need to also emphasize the importance of passengers in the car taking note of the dangerous activity occurring and recognizing it as such, taking personal responsibility for addressing it, and believing that they can successfully intervene (e.g., by taking over the activity of texting for the driver). Addressing all the stages leading up to intervening and providing explicit strategies for each stage can also help to overcome the obstacles that often block action (diffusion of responsibility, evaluation apprehension, and pluralistic ignorance).

Theory of Interpersonal Behavior (Frequency Rating: High)

The TIB (Triandis, 1979) includes similarities to the TPB in that the constructs social factors, affect, and perceived consequences predicting behavior change are included in both theories. However, this theory also considers the role of habits and posits that the influence of habits on behavior increases as the level of consciousness regarding the behavior decreases. While the literature review did not reveal documents providing specific evidence of this theory related to DDB or impaired driving, it was identified in one practical manual as a behavior change theory to consider for traffic safety improvement campaigns (Delhomme et al., 2009) and was thus included in this study for consideration by the expert panel. The theory constructs considered by the expert panel were social factors, perceived consequences, and affect, leading to intentions and habits.

The TIB was applied in 4 DDB campaigns (*It Can Wait*, *Stop the Texts*, *Stop the Wrecks*, *Talk Text. Crash.*, and *One Text or Call Could Wreck It All*) and 6 impaired-driving campaigns (*Think! Drink Driving*, *Sober or Slammer*, *What Will YOU Lose?*, *ENDWI Buzzkill*, *Booze It & Lose It*, and *Drive Sober or Get Pulled Over*).

Several campaigns used videos, statistics, and other persuasive messaging to encourage drivers to pledge to avoid driving distracted. Those material incorporated affect, perceived consequences, intentions, and habit (this construct was the weakest in most examples and required some inference that the pledge served to frequently reinforce the behavior leading to development of a habit). The *It Can Wait* campaign also used social media and the campaign website to share others' pledges, and added social factors, as well. Therefore, if all those components reach the audience, the TIB is applied in this campaign. The *Stop the Text Stop the Wrecks* and *One Text or Call Could Wreck It All* campaigns provided similar examples given that all components, including videos, pledges, websites, and social media, reach the audience.

Although it did not use social media, the various components of the *Think! Drink Driving* campaign (fear appeals, written advice, and modeling of social influences and the target behavior via videos) reflected the TIB. Several components combined to reflect the TIB in *What Will YOU Lose?*, *ENDWI Buzzkill*, *Booze It & Lose It* (particularly the stories and videos shared on the

campaign website), and *Drive Sober or Get Pulled Over* (particularly the *How Will It Feel* video series showing people from various social roles, rules that govern behavior, affect, and consequences).

Alternatively, one specific message within the *Talk. Text. Crash.* campaign reflected the TIB; the message Don't let your phone drive you and its supporting material displayed the TIB construct of habit in what appeared to be an attempt to break the habitual behavior of texting while driving.

Several campaigns included some TIB constructs but not enough for the theory to be considerable applicable. Applicable constructs included social factors (1 DDB campaign and 5 impaired-driving campaigns), perceived consequences (6 DDB campaigns and 3 impaired-driving campaigns), intentions (2 DDB campaigns and 1 impaired-driving campaign), affect (1 DDB campaign and 1 impaired-driving campaign), and habits (1 DDB campaign).

Theory of Planned Behavior (Frequency Rating: High)

According to the TPB (Ajzen, 1991), the most important factor that determines whether someone will engage in a behavior is behavioral intention. Perceived behavioral control (self-efficacy), attitudes toward the target behavior, and perceptions of important others' beliefs about the target behavior (social norms) combine to predict behavioral intentions. Those constructs can be used to create campaign messages that encourage positive value for a target behavior (low cost, high reward) and negative value for a harmful behavior (high cost, low reward). The literature review identified more documents about this theory than any other, with 11 documents related to DDB, 9 documents related to impaired driving, 6 documents related to other driving behaviors, and 2 documents related to health-related behaviors. While many of those studies modified the theory components in some way, most only examined parts of the theory, or lacked standard construct measures. Several studies examining the full or extended versions of the theory found support for the TPB to predict actual or intended DDB (Chen et al., 2016; Nemme & White, 2010; Prat et al., 2015; Rozario et al., 2010) or impaired driving (Åberg, 1993). The theory constructs considered by the expert panel were attitudes toward behavior, social norms, self-efficacy, technology inclination, anticipated guilt, empathic concern, and self-esteem.

The TPB was applied in 2 DDB campaigns (*Stop the Texts. Stop the Wrecks* and *One Text or Call Could Wreck It All*) and 5 impaired-driving campaigns (*Sober or Slammer*, *What Will YOU Lose?*, *Buzzed Driving Is Drunk Driving*, *ENDWI Buzzkill*, and *Booze It & Lose It*).

Several campaigns included videos that modeled a behavior (i.e., texting while driving, driving impaired), assigned a negative value to that behavior to affect attitudes (via images of crashes and harm to the driver or others), conveyed social sanction or disapproval of the behavior (subjective/social norms), and modeled achievable strategies to prevent the behavior. Examples of campaigns with videos that displayed the theory of planned behavior included *Stop the Text. Stop the Wrecks*, *Sober or Slammer*, *What Will YOU Lose?*, *Buzzed Driving Is Drunk Driving*, and *Booze It & Lose It*. Within those campaigns, the TPB was only observed in the videos. *One Text or Call Could Wreck It All* included material that reflects TPB, including a video and statistics showing negative consequences of texting while driving and implying social sanction (subjective/social norms) along with a pledge and contract to boost self-efficacy to change behavior. In this example, exposure to the full combination of material is needed for the TPB to be considered applied. Similarly, *ENDWI Buzzkill* was targeted to alcohol servers and combined messages about shared responsibility, facts about serving laws and consequences, facts about

impaired driving and consequences, server training videos, downloadable posters, and other resources for an overall campaign that reflected the TPB.

Several campaigns included some of the TPB constructs, but not enough for the theory to be considered applied. Attitude toward behavior was observed in 5 DDB campaigns and 3 impaired-driving campaigns. Attitudes were most often incorporated via negative portrayals of DDB/impaired driving and positive portrayals of avoiding DDB/impaired driving. Subjective/social norms were observed in 2 DDB campaigns and 2 impaired-driving campaigns. The construct of self-efficacy was the least common of the core TPB constructs. It was applied in 1 additional impaired-driving campaign. In most cases in which a campaign fell just short of being noted as using the TPB, it was because it did not incorporate self-efficacy.

Theory of Reasoned Action (Frequency Rating: High)

This theory proposes that behavioral intentions are the most relevant predictor of whether a person will or will not engage in a behavior (Madden et al., 1992). Intentions depend on people's beliefs about what will happen if they engage in a behavior, and those beliefs are divided into two types: attitudes and SN. The constructs for this model are intention (a person's motivation, or willingness, to try to engage in a behavior), ATB (how much a person values a specific behavior), and SN (a person's feelings or judgement of the opinions of other people around them, such as family and friends). The theory constructs considered by the expert panel were attitudes, outcome expectancies, outcome valuations, and SN.

The TRA was observed in 8 campaigns considered in this study. The campaigns included 2 for DDB (*One Text or Call Could Wreck It All* and *Stop the Texts. Stop the Wrecks*) and 6 for impaired driving (*Booze It & Lose It*, *Buzzed Driving Is Drunk Driving*, *ENDWI Buzzkill*, *Drive Sober or Get Pulled Over*, *Sober or Slammer*, *Think! Drink Driving*, and *What Will YOU Lose?*). The relevant campaigns generally used a set of material that, when used together, fully encompassed the TRA. For instance, *What Will YOU Lose?* used a combination of videos and posters (in both English and Spanish) to draw attention to the consequences of driving while under the influence in Colorado. The material used real stories to communicate the negative outcomes of alcohol-impaired driving, as well as the likelihood of experiencing those outcomes, to connect with the audience to shape attitudes and SN.

Several campaigns included some of the theory of reasoned action constructs but not enough for the theory to be considered applied. Notably, ATB was the most frequently observed construct from the TRA and was found in an additional 5 campaigns, and SN (4 additional campaigns).

According to the TRA, a person's behavior is determined by his/her intention to perform the behavior. Therefore, when using this theory as the basis for a traffic safety campaign, messaging directed at a person's attitude toward the behavior as well as his or her beliefs about what others think about the behavior are necessary components. To effectively apply the TRA to DDB and impaired-driving campaigns, it is likely that a combination of messaging material will be necessary. This study found no stand-alone material from any campaign that reflected enough constructs for the TRA to be noted as applied. Therefore, in the campaigns reviewed, a constellation of material focused on different constructs (e.g., videos, pledge cards, contract, and statistics) was observed.

Theory of Self-Regulation (Frequency Rating: Low)

The TSR (Baumeister & Voas, 2007) asserts that behavior change occurs when people compare their current situation with a goal or reference situation (what the person is trying to achieve). If there is a discrepancy, then they will act to minimize the discrepancy. While the literature review did not reveal documents providing specific evidence indicating that this theory predicts behavior change from DDB or impaired-driving campaigns, it was identified in one technical manual as a behavior change theory to consider for traffic safety improvement campaigns (Delhomme et al., 2009). The authors noted the importance of understanding the goal and target audience of the campaign to encourage the audience to accept the campaign goal, and then to aid the target audience in achieving it. The theory constructs considered by the expert panel were reference value, comparator, input function, output function, impact on environment, and disturbance.

None of the DDB or impaired-driving campaigns considered in this study displayed the TSR or any of its constructs.

Transtheoretical Model/Stages of Change (Frequency Rating: Low)

This theory suggests that people go through six stages of behavior change before a new behavior is fully established (Prochaska & DiClemente, 1983). People can move forward or backward through the stages. The theory can be useful for targeting an intervention to a specific stage, based on an analysis of the individual needs of members of the target population. The six stages of change are:

1. pre-contemplation (no intention to change behavior and may resist change),
2. contemplation (aware of problem, but no action is undertaken),
3. preparation (beginning to prepare for behavior change),
4. action (behavior change has occurred but still at high risk for reverting back to old behavior),
5. maintenance (behavior is starting to become a habit), and
6. termination (the behavior is firmly established).

While the literature review did not reveal documents providing specific evidence of this theory related to DDB or impaired driving, it was identified in two technical reports as a behavior change theory to consider for traffic safety improvement campaigns (Delhomme et al., 2009; Robertson & Pashley, 2015), and it was also identified in two review documents recommending theories for changing non-driving health behaviors (Luca & Suggs, 2013; Anker et al., 2016). The theory constructs considered by the expert panel were pre-contemplation, contemplation, preparation, action, maintenance, and termination.

None of the DDB or impaired-driving campaigns considered in this study displayed the TM theory or any of its constructs. While this theory is most often used in health counseling and personalized interventions, the expert panel recognized its potential for use in developing campaign messages for target audiences of people at the various stages of change.

Interviews With State Highway Safety Office Representatives

After the conclusion of the expert panel, a limited number of interviews were conducted with SHSO representatives responsible for administering some of the campaigns included in the study to obtain information about the campaigns beyond what was provided on the campaign websites.

The investigators conducted the interviews by telephone. One interview was conducted for each of five participating States. Each State was provided the discussion questions in advance and was asked to include any people needed to provide the information requested. A study team investigator trained in qualitative data collection moderated and facilitated each interview. The researchers disclosed that the interviews would be audio recorded. The interview length ranged from 45 to 65 minutes. In all, interviews included discussions of 3 impaired-driving and 3 DDB campaigns.

The expert panel's discussions and resulting categorizations of theories and constructs contributed to preparation for the interviews in several ways. First, the results of the expert panel's categorization helped the investigators identify States with theory-related campaigns and States with campaigns that did not have theoretical underpinnings, both of which were of interest to the researchers. Additionally, the expert panel's discussions themselves and resulting notes included factors about campaigns that aided and hindered their assessments of the campaigns. Knowing about these factors helped guide the investigators' development of the interview discussion topics, shown in Table 4.

The interview notes and recordings were analyzed using an open, focused coding process (Strauss & Corbin, 1998). Codes (i.e., summary terms using the words of the respondent) were assigned through a line-by-line analysis of the raw data. From the codes, themes that emerged from the data were developed. Using a method of constant comparison by Strauss and Corbin (1998), the themes were revised and refined based on an examination of homogeneity (Patton, 2001).

Table 4. Summary of discussion topics from the interviews with State representatives

Topic Area	Content
Target behavior	Safety issue targeted, primary campaign message.
Campaign description	Objective, general description, key message, timing, special events (start/end dates), length of time available, and (if possible) co-occurring intervention efforts (e.g., HVE).
Development and decision making	Overall reason for any decisions regarding the use of a campaign, such as: used by another jurisdiction, past effectiveness, feasibility, outside advice, other information (described).
Timing	Start, duration, specific characteristics about timing (e.g., day of week, time of day, holidays).
Medium(s) used	Flyers, TV spots, radio, social media, and so forth.
Target population & environment	Description of the people (e.g., age, sex, cultural background, other characteristics), geographic region of campaign—State/local jurisdiction, desired reach, other specific location considerations (e.g., delivery around alcohol vendors, in vehicle—proximity to driving).
Enforcement/Co-occurring efforts	Any added role of enforcement, enforcement consequences (where relevant).

Topic Area	Content
Evaluation	Mandatory component: undertaken/not (followed by open-ended, if so how). Additional component (process considerations-checklist): perceptions of reasons why effective/not effective, any measurement/indicators-type of evaluation (checklist), perceived ways the campaign could be improved, understanding of the reach/distribution.
Overall	Changes they would make today, final thoughts about campaign.
Feedback about the resource	Information and format that would be useful for a resource report.

State Interview Findings

The following themes emerged.

Development and Decision Making

- Typically, States used the NHTSA campaign material and customized it for their own campaign material. Most impaired-driving campaigns conducted by States were modified versions of *Drive Sober or Get Pulled Over*; 2 original DDB campaigns were included.
- Most States used outside marketing/communication firms to develop material.
- None intentionally used behavior/communication theory or did not know if it was used, and two States were unclear about what it meant to use theory to develop a campaign.
- Overall, there was no broad or comprehensive campaign plan, but instead components were developed on general knowledge and as opportunities arose (i.e., advantageous resources or partnerships emerged).
- None of the campaigns were pilot tested by the States.

Timing

- Timing of campaign activities was driven primarily by the NHTSA campaign calendar with additional events in some States.
- Most of the campaigns had been ongoing for several years (as far back as the mid-1990s) and there were plans to keep them going if possible.

Medium Used to Deliver Messages

- A broad range of media was used including public service announcements (PSAs), posters, billboards, pledge cards, online ads, quarterly newsletters/email blasts, radio ads, and websites.
- Earned media included social media posts and press releases.
 - Several States commented that as fewer people read newspapers, they were shifting to more social media (including Facebook, Twitter, Instagram, YouTube, and Facebook Live).

Target Population

- Most campaigns were conducted statewide and identified target groups based on crash and citation data.
- Age 18-to-34-year-old males was the most identified target population for both impaired-driving and DDB campaigns.

Target Location

- Most mentioned targeting counties based on crash/citation data.
- Rural areas were mentioned as examples of locations targeted based on data.
- One DDB campaign targeted business owners (discouraging employee cell phone use – that was based on an agency director driving past a plant parking lot and having the idea).

Enforcement

- All the campaigns based on NHTSA campaigns had enforcement components.
- The DDB campaigns that were original creations by States did not include enforcement (due to limited resources).

Evaluation

- Mainly limited to tracking paid media and State crash data.
- Few public awareness surveys were conducted.
- There were some comments that evaluation was not worth the cost.

Overall – What Would Do Differently

- One participant said he/she would use data more for planning campaign efforts.

Feedback About Resource Report

- All participants would like best practices – to learn from what has and has not worked in other States.
- One participant reported getting overwhelmed by media providers and wanted to know what to look for when selecting media and how to get the most exposure with the least amount of money.
- Participants thought there would be some benefit from information about theories, but if it was too technical it would not be useful.

Implications

Collectively, study findings suggest that the user-friendly resource report should include information to help States design material to use theory constructs in a manner that implements accepted behavior change theory.

- Interviews with representatives of States with DDB or impaired driving or both campaigns indicated that they believed there would be some benefit from receiving information about theories, but not if it was presented in a manner that was too technical.
- States would like more information about best practices – to learn from what has and has not worked in other States.
- Theory is observed in existing distracted and alcohol-impaired driving campaigns. It can be infused into standard campaign design and development processes. The expert panel determined that 14 theories were observed in 26 recent traffic safety campaigns.
- Results from the literature review suggested that no single theory should be held up as the only useful theory for DDB and impaired-driving campaign development. Theory selection should be based on consideration of several factors including the behaviors being addressed and target audiences.

In agreement with many researchers included in the literature review, the authors emphasize that only campaigns guided by a theory can be evaluated in terms of the constructs used within the campaign. If this is done, the results can be used to help understand the outcomes of the campaign and provide information regarding changes that could be made to ensure more effective messaging. Information learned during the State interviews suggested that this remains an untapped opportunity.

- None of the campaigns were pilot tested.
- Evaluations of theoretical constructs were rarely conducted by States; rather, evaluations that were conducted consisted of tracking paid media and examining crash data.
- Effort may be required to convince States about the value of conducting evaluations given their limited resources. However, States and other implementers will explore adopting theory with proper instructions.

Conclusions

The tasks and results included in this technical report were designed to provide the content of a resource that States and other jurisdictions can use to improve existing campaigns and develop more effective campaigns to combat behaviors that compromise driving safety, particularly DDB and impaired driving. The literature review found evidence for the importance of considering behavior change theory as a guide to campaign design, primarily about the development of campaign material about health and traffic safety related behaviors (including DDB and impaired driving). However, findings from the five State interviews suggested that this has been a missed opportunity in campaign design.

- According to the panel of experts, most campaigns were consistent with at least one theory. This theory could support an evaluation of the campaign. Despite the evidence in the literature for the theories included in this study, 12 theories were not applied in any of the 29 campaigns examined by the expert panel.
- None of the State respondents interviewed knowingly used behavior/communication theory to develop their campaigns.
- For the State campaigns, there was no broad or comprehensive campaign development plan, but instead components were developed based on judgement and as opportunities arose.
- States and other jurisdictions (and their funding sources) may need to be convinced about the value of using behavior change theory in the development and evaluation of campaigns.

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Appendix A: Letter Report

**Volpe National Transportation Systems Center
55 Broadway, Kendall Square
Cambridge, MA 02142**

To: Elizabeth Deysher and Dr. Eric Nadler, Volpe, the National Transportation Systems Center,
U.S. Department of Transportation.

Re: Letter Report for Project Titled Review of Risk Communication Strategies and Existing
Distracted and Impaired Driving Messages (DTRT5716C10014).

From: Lisa J. Molnar, David W. Eby, Renée M. St. Louis, Jennifer Zakrajsek, Nicole Zanier, and
Lisa Buckley
University of Michigan Transportation Research Institute (UMTRI)

September 1, 2017

Introduction

It is estimated that there were 35,200 fatalities from MVCs in 2015 (NHTSA, 2016). In 2013, alcohol-impaired drivers were involved in 31% of fatal MVCs (NCSA, 2014) and driving DDB was estimated to have contributed to 10% of fatal MVCs (NCSA, 2015). The burden of harm extends when considering nonfatal injuries. DDB, for example, was estimated to have contributed to a further 424,000 nonfatal injuries (NCSA, 2015). Together, DDB and alcohol-impaired driving are factors in a significant proportion of motor vehicle-related injuries.

Communication campaigns are among the most widely used efforts to promote traffic safety and can be used to promote safe driving practices and knowledge of traffic laws, and otherwise educate the public (Robertson & Pashley, 2015). This project seeks to better inform DDB and impaired-driving campaigns by identifying non-enforcement-based health and safety communication strategies, and the communication and psychological theories likely to support campaigns that prevent DDB and impaired driving. Theory outlines relevant constructs to be targeted and how to manipulate them in a campaign, provides testable hypotheses, identifies meaningful measures for effectiveness evaluation, and brings the theoretical constructs to a logically derived outcome. The presence of logic, internal consistency, testability, measurability, and plausibility are enhanced using a theoretical design.

This report reflects the content of an annotated bibliography that documented results from an extensive review of the literature. The review was intended to gain insights into behavioral change and communication theories that are or could be used in communication campaigns to address DDB and impaired driving. Following this introductory section, we present an overview of the methods used to conduct the literature review and develop the annotated bibliography (Methods section). Next, we summarize the findings themselves (Findings section), organized around the primary focus areas of the annotated bibliography: (1) theory fit and how theoretical constructs predict behavior, based on studies using theory to predict traffic safety behaviors relevant to impaired driving or DDB; (2) theory as it has been applied to communication strategies in evaluations of campaigns; (3) other evidence of theory which includes review papers which aid in providing additional evidence. To the extent possible, we present findings about theories and theoretical constructs separately for DDB, impaired-driving, and other health behaviors. In the Findings section, we also include a supplemental subsection on Campaign/Communication Strategies that draws upon and extends results from the annotated bibliography to consider strategies for the delivery of campaign messages, including message framing and emotional appeal strategies, as well as the context of campaign delivery. Finally, we summarize findings by section and discuss overall conclusions, as well as make recommendations for the expert panel (Conclusions and Discussion section).

Methods

Task 4: Literature Review Overview

The literature-review included two components, an annotated bibliography and this letter report. The literature search and annotated bibliography identified non-enforcement-based health and safety communication strategies and the communication and psychological theories likely to support campaigns that prevent DDB and impaired driving (regardless of the sources of distraction or the degree of impairment). To ensure that we identified relevant literature, the review was not limited to the targets of impaired driving and DDB, but included literature relevant to traffic safety campaigns, more generally. For example, the review included campaigns to increase seat belt use.

The overall literature review had three key foci: (i) theory fit and how theoretical constructs predict traffic safety behaviors based on existing research that tests whether the theory predicts traffic-safety behavior or other behaviors relevant to impaired driving or DDB; (ii) research examining theory applied to communication strategies in evaluation studies of health campaigns (not necessarily traffic safety related); and (iii) other evidence related to theory (whether a specific theory was mentioned or not). Three tables presented in the bibliography reflect each of these areas. A fourth table in the annotated bibliography provides a summary of theories.

Annotated Bibliography

Search Process

A comprehensive systematic search was conducted to provide methodological rigor and confidence that the findings of the review reflect the available literature. The search was conducted in two phases. The first phase primarily targeted theoretical articles related to changing DDB and impaired driving. The second phase was designed to examine behavior change articles across a broad range of health behaviors with a goal of finding articles about behavior change theories, interventions, and campaigns that could potentially be applied to DDB and impaired driving.

Sources/Obtaining Literature

The following databases were used for both phases of the search: EBSCO, ScienceDirect, PubMed, Medline, PsycInfo, CINAHL, Cochrane, Scopus, EMBASE, Proquest, and Communication & Mass Media Complete. We also searched the reference lists of the papers reviewed. We examined recent articles, including those from other countries with similarly advanced transportation systems, laws, and infrastructure (e.g., Hutchinson & Wundersitz, 2011; Robertson & Pashley, 2015). The third table in the annotated bibliography summarizes several review papers. Some papers were excluded because they were not behavioral studies or they studied irrelevant behavior (e.g., a study of traffic flow modeling), they did not include theory or theoretical constructs, or the work was not related to campaigns or theory (e.g., a study undertaken with offenders, or not designed or evaluated using theory). Literature that met inclusion criteria was identified initially by reviewing titles, abstracts, and then the full text.

In addition, we were guided by a recent scoping study that identified theories about health behavior that have previously been used across the social and behavioral sciences (see Davis et al., 2015). That review identified 82 separate theories. We reviewed those theories and excluded

any that had been used in only a single published paper. The remaining theories that had not already been identified by the initial literature search were then reviewed for relevance to campaign design and to a lesser extent for relevance to design of campaigns for traffic safety. For example, the AIDS Risk Reduction Model was excluded. Published studies were then sought that were related to the theory. Meta-analyses were given priority as they provide a gold standard of evidence and reflect a systematic collation of several studies to develop a conclusion with greater statistical power.

Publications

Journal articles, conference proceedings, technical research reports, government reports, and books, were included in the search, as well as other sources. The resulting studies were not limited to those conducted by researchers at academic institutions, but were restricted to those available in English. We also sought to include the primary sources of literature.

Search Terms, Screening, and Evaluation for Relevance

The following search strings were used in the first phase to focus on impaired driving:

*(behavio*r change theor* OR psychology theory OR communication theory OR theory of planned behavio*r OR health belief model OR social cognitive theory OR social network OR norm) AND (driv* OR car OR motor vehicle OR transport OR traffic OR road)*

AND (alcohol OR drink OR buzz* OR impair* OR wine OR beer OR DWI OR DUI)*

A complementary search in the first phase focused on DDB using the following terms:

AND distract OR phone OR text* OR reaching for object OR electronic device OR passenger* OR internet OR web OR eat* OR drink* OR read OR watch* video OR groom* OR navigation device OR navigation system*

Due to the complexity of the subject, search strategies involved a combination of controlled vocabulary and connectors/operators. When possible we used advanced search to filter for source type and document type to narrow the scope. The search was done for all available years. Search results from each database were exported to Endnote, organized, and duplicates were filtered. During the review of titles and abstracts the literature was limited to countries or jurisdictions with relevance to the traffic context in the United States.

We focused on research studies rather than descriptive or opinion pieces. However, where descriptive studies and opinion pieces provided some empirical evidence, they were included (i.e., other sources). We included non-controlled evaluation studies, but noted the nature of the evaluation.

In the second phase of the search, the following search string was used: ((SU behav* change OR SU health behave*) AND (SU theor* OR TI theor*) AND SU (intervention OR campaign OR program OR meta-analys* OR review OR evaluation OR persua* communic*)). This phase was limited to English or English translations, and to peer reviewed publications. Because of the breadth of the literature searched in the second phase, commentaries, editorials, opinion pieces, letters to the editor, conference abstracts, and dissertations were excluded to make the scope of the search manageable. In addition, articles that focused only on specific groups or populations were excluded (e.g., pregnant women, cancer patients), as well as articles on theories already

covered in the first phase of the search to prevent the annotated bibliography from becoming cumbersome and to ensure that the added articles were providing value.

Several of the articles resulting from the new search addressed various communication strategies and reviews of the effectiveness of health-related communication campaigns (including assessments of the role of theory). A new section was added to the annotated bibliography to present these articles. Traffic safety was the main focus of only one of the manuscripts but the other manuscripts were included because they examined the type of communication campaigns most likely to be included in this study's campaign inventory (e.g., mass media targeted to the general public), include novel communication approaches that could be included in traffic safety campaigns (e.g., narrative communication), or address a challenge inherent to traffic safety campaigns (e.g., risk communication for small-probability events). The expanded search terms used in the new search also captured several articles about interpersonal communication or counseling and interventions that involved individualized or tailored intervention content. Those articles were excluded as we determined those modes of intervention to be outside the broad, communication campaign strategies of this project.

Findings

In this section, findings are presented separately for the primary focus areas of the annotated bibliography (theory fit, evaluation or campaign studies, and other evidence of theory). Also included is a supplemental section on campaign/communication strategies that draws upon and extends results of the annotated bibliography. It should be noted that the findings discussed in this letter report relative to the focus areas also include eight studies identified after approval of the annotated bibliography and therefore are not contained in the annotated bibliography (i.e., Baban & Craciun, 2007; Bui et al., 2013; LaVoie & Quick, 2013; McEachan et al., 2016; Ogden, 2003; Satterlund et al., 2012; Sutton, 2008; Wilson, 2007).

Background

In general, a theory refers to a system of assumptions and rules to describe, predict, and explain the nature of specified phenomena (Nigg & Jordon, 2005, p. 292). Within the context of human behavior, theories provide structure and describe factors underlying behavioral motivation (Buckley & Sheehan, 2004). Theories can play an important role in the development of campaigns to change behavior by providing a conceptual framework that describes and explains the interrelationships among underlying constructs and by predicting and explaining events in an accurate and efficient manner (Glanz et al., 2002). As explained by Buckley and Sheehan (2004), campaign designers can use theory to identify, and then later operationalize, the constructs that have demonstrated to be causative or moderating influences on the chosen behaviors.

In selecting specific theories to guide campaigns, it makes sense that preference be given to those previously shown to predict, with consistency and strength, the intended change in the target behavior of the target population. For example, if the purpose of a campaign is to reduce high school students' texting while driving, the campaign should draw on a theory that has already been shown to be effective with this target population and behavior. However, where such evidence is not available, but a theory has been shown to effectively predict the outcomes of campaigns targeting other traffic safety behaviors (e.g., speeding) in the target population of interest, that theory could be applicable if it can be used to address the behavior of interest.

Given the importance of establishing an evidence base as noted above, theories should be able to explain and predict the desired outcome in an empirically testable and coherent manner. This enables evaluation of the effectiveness of the campaign and assessment of the motivations and attitudes or other constructs that were addressed by the campaign to alter the outcome behavior. Material should be ecologically valid, fitting the context in which it is applied, and match the new ideas and skills presented with the current beliefs of the audience. Thus, theory-derived campaign strategies are most valuable if they are flexible enough to be adapted to various target audiences and differing cultural and community contexts (Noar & Zimmerman, 2005).

Theories used to guide communication campaigns typically come from the fields of psychology and communication (Hutchinson & Wundersitz, 2011). Within the specific realm of traffic safety, many theories have been used to better understand and change the behavior of road users. These theories help predict the likely reactions to safety measures by explaining motivations, as well as identifying how best to communicate the need and provide the impetus for behavioral change (Davis et al., 2015).

In this letter report we focused on theories of communication and behavior change, and on campaigns and strategies that go beyond the mere provision of knowledge. A health behavior,

theory-based approach to designing campaigns best suits this purpose. It should be noted up front, however, that there is no single theory or component of a theory that can explain all risky behaviors or that is necessarily superior to all other theories in explaining or changing a single behavior. Nonetheless, there can be features of the target audience and context that help determine the fit of the theory to the target behavior, taking into consideration the communication strategies and presentation modes to be used. Implementation factors such as timeframe (e.g., delivery over weeks, months, and years) and whether the campaign is implemented at high-risk times (such as holiday weekends) or more generally also need to be considered when selecting a theoretical approach. Thus, the annotated bibliography, and hence this letter report, focus not only on the theories themselves that guide campaign development, but also the strategies and contexts of campaign delivery.

Theory Fit

Overview

In this section, findings are summarized for studies that assessed whether various theories or theoretical constructs were associated with engagement in a particular behavior or behaviors. Findings are discussed separately for theories and theoretical constructs. Within the Theories section, findings are further broken out by DDB, impaired-driving, other driving behaviors, and health.

Theories

Table 5 shows the number of studies in the annotated bibliography that used particular theories in addressing DDB, impaired-driving, other driving-related behaviors (i.e., risky driving, speeding, and restraint use), and health-related behaviors (e.g., nutrition, exercise, alcohol use, and sexual behaviors).

*Table 5. Theories mentioned in studies in literature review by behavior**

Theory Name	Study Mention by Behavior				Total
	DDB	Impaired Driving	Other Driving	Health	
Automaticity Theory	1	1	0	2	4
Extended Parallel Process Model	0	0	0	1	1
Health Action Process Approach	0	0	1	1	2
Health Belief Model	2	1	3	0	6
Information-Motivation-Behavioral Skills Model	0	0	0	1	1
Prospect Theory	0	0	0	1	1
Protection Motivation Theory	0	0	0	1	1
Prototype Willingness Model	0	1	1	0	2
Reinforcement Sensitivity Theory	0	1	2	0	3
Regulatory Fit Theory	0	0	0	1	1
Self-Determination Theory	0	0	0	1	1

Theory Name	Study Mention by Behavior				Total
	DDB	Impaired Driving	Other Driving	Health	
Social Cognitive Theory	0	0	1	1	2
Theory of Planned Behavior	11	9	6	2	28
Theory of Reasoned Action	0	1	0	0	1
Total	14	14	14	12	54

* If a theory is examined or mentioned in a study regarding more than one behavior, it may show up more than once in the table (e.g., if it is examined for both impaired driving and health). Thus, the numbers in the table represent study mentions rather than distinct studies.

Findings Relative to Distracted Driving Behavior and Impaired Driving

As can be seen from Table 5, one theory clearly stood out as a predominant focus of studies on DDB and impaired driving – the TPB. This theory was examined or at least mentioned in 20 studies on DDB and impaired driving collectively, and an additional 6 studies on other driving related behaviors. In fact, the next most frequently mentioned theory, the HBM, was only cited in 3 studies on DDB/impaired driving and three on other driving behaviors. AT was examined in two studies on DDB/impaired driving. Three additional theories PWM, RST, r-RST, and TRA were each mentioned in one study on DDB/impaired driving (and some on other driving behaviors as well). Given the dominance of TPB in the literature on DDB and impaired driving, and to a much lesser extent the HBM, these 2 theories are described first within the context of their fit in terms of behavior change, with descriptions of the other theories mentioned with regard to DDB and impaired driving following in alphabetical order. Finally, we describe 2 theories – HAPA and SCT, which, while not focused on DDB or impaired driving, did focus on other driving behaviors.

Theory of Planned Behavior

TPB posits that behavioral outcomes are predicted by behavioral intentions (Ajzen, 1991). The intention to perform a behavior is the combined outcome of PBC (i.e., self-efficacy), attitudes towards the outcome behavior, and social norms; thus, these three constructs are posited to indirectly predict behavior through intention. Attitudes toward the behavior, social norms, and PBC are posited to mutually inter-correlate. The performance of the target behavior is positively (few costs, high reward) or negatively valued (high cost, little reward). The construct of attitudes toward the behavior is weighted by the belief that performance of a preventive behavior will lead to the intended positive outcome. The construct of social norms is weighted by the perception of important others' beliefs about the behavioral outcomes (normative pressure). The construct of PBC is based on an assessment of the ease or difficulty of performing the target behavior. Intention refers to a readiness to perform the target behavior.

In addition to these core constructs, several other constructs were associated with TPB in at least one study identified in the literature review including: moral norms (a belief in how one ought to behave; Moan, 2013); technology inclination (a perception of oneself as an early adopter and one who is comfortable with new technology; Chen & Donmez, 2016); anticipated guilt (a tendency to avoid certain behavior based on an expectation that one will subsequently experience feelings of guilt; Wang, 2016); empathic concern (other-orientated emotions which include three components – congruence with the valence of the emotion, multiple emotions, and are other-

orientated; Batson, 1991); and self-esteem (perceived valuation of one's worth; Rosenberg, 1965).

Collectively, driving safety studies using TPB as a guiding framework had both strengths and weaknesses regarding representativeness and generalizability of the research, adequate sample size, sufficient development and piloting of measures or use of standardized measures, and assessing constructs in a way consistent with the original definition of TPB as developed by Ajzen. Many studies did not test the predictive strength and validity of the complete intact model including all indirect and direct effects, and there was an over-reliance on tests of the associations between individual constructs or a subset of the construct and behavioral outcome. In addition, there was a lack of research that predicted the behavior in a temporal manner (i.e., showing that the associations among the constructs of the theory were associated across time, such that construct A at time X predicted intermediate outcome B at time Y, which predicted the outcome, C at time Z).

There was also variation in the measures used, and how they were developed, piloted, and aligned with the constructs as defined by TPB (Ajzen, 1991). For example, some studies redefined attitudes as a more general belief rather than as the weighing and evaluation of potential positive or negative outcomes relevant to the target behavior. Other studies did not address the target population's values or the importance of potential positive and negative outcomes. For example, some presented a list of potential outcomes such as getting a ticket, paying a fine, or being injured in a crash, but did not assess the influence of the characteristics of the audience on the relative value of each outcome. Other studies lacked precision – for example, Beullens et al. (2011) described their study as framed within TPB, but they only examined intentions and attitudes, which were not evaluated in a manner consistent with TPB principles. Benson et al. (2015) provided an example of an elicitation study in which pilot work was used to identify relevant beliefs for predicting texting and driving behavior.

Despite these variations and limitations, a number of studies using partial, full, or extended versions of TPB as a guiding framework to examine DDB and impaired driving did yield positive results in that at least some of the theory's underlying constructs predicted actual or intended DDB or impaired driving (e.g., Åberg, 1993; Chen et al., 2016; Nemme & White, 2010; Prat et al., 2015; Rozario et al., 2010). In a study by Walsh et al. (2008) yielding only partial support for TPB, a key finding was the importance of attitudes in drivers' decisions to use a mobile phone regardless of the type of use or driving scenario. The authors recommended that campaigns to reduce mobile phone use should discourage positive attitudes toward such use and challenge drivers to weigh the advantages of mobile phone use against the increased risk of a crash. Results from the review also suggested that the predictive power of TPB may vary depending on the age and gender of study participants. For example, Moan found that TPB explained 27% of men's and 17% of women's intentions to not ride with an intoxicated driver. Regarding age, TPB explained 40% of the variance in intentions among young people and 20% for older passengers (age 35 and older). Driving purpose (e.g., business versus pleasure) emerged as an additional factor that affected the amount of variance accounted for by TPB constructs (e.g., Walsh et al., 2008).

Health Belief Model

Five articles reviewed used HBM to study driving behavior (two on DDB, one on impaired driving and speeding, and two on other driving behaviors). In HBM, the likelihood of a

behavioral outcome is predicted by several constructs including: perceived threat (conceptualized as a combination of perceived severity and susceptibility); self-efficacy; cues to action; and a variable comprised of perceived benefits versus perceived barriers (Rosenstock, 1974). Perceived severity is the assessment of the severity of the consequences of the negative health outcome, perceived susceptibility is the assessment of the likelihood of the negative health outcome, perceived benefits are the assessment of the advantages associated with taking action to avoid the negative health outcome, and perceived barriers are the assessment of the obstacles to performing actions needed to avoid the health outcome. Cues to action are considered triggers or prompts to engage in the health behavior (e.g., intervention messages, slogans, or observing the negative health outcome in others). Self-efficacy is often included in HBM and reflects a perception that one possesses the ability and competency to perform the target behavior. Variables that modify associations among the constructs of HBM include demographics (e.g., age, race), psychosocial variables (e.g., personality, social class), and structural variables (e.g., knowledge, prior experience).

Of the studies examining HBM, two were by the same authors, used similar methodologies, and included additional variables that were not part of HBM. The first study focused on speeding behavior as well as impaired driving and the outcomes related to impaired driving were driver anger, road-unrelated illusory invulnerability (e.g., compared with peers, how susceptible they are to harm), peer influence, and perceived costs (e.g., taking longer) as predictors. The second study used data from a sample of university students; hence, the results are less generalizable. Intentions to speed were predicted by sensation seeking, driver anger, general perceived risk (not road related), general perceived susceptibility, and susceptibility that was specific to speeding. While both studies had adequate sample size, the measurement of theoretical predictors was not always specific to the target behavior, and the measures were largely developed for these studies, were not standardized, and were of unknown reliability and validity. In the second study with the student sample, impaired driving was one of several traffic safety behaviors measured. Intentions for impaired driving were only predicted by peer influence in the full model. The interaction of sex with perceived susceptibility predicted impaired driving intentions, but only when the interaction was the only predictor included in the model. The results of this unadjusted prediction found that males with lower perceived susceptibility had greater impaired driving intentions. The test of the interaction showed no relationship of perceived susceptibility and impaired driving intentions for females.

The other two studies focused on DDB. One qualitative study involved 25 college students (median age=24 years; Beck & Watters, 2016). Study participants described their interpretation of HBM constructs including, barriers to stop texting and driving (e.g., intervening is rude), and perceived susceptibility and severity (i.e., threat) of the outcomes of texting (e.g., crash, non-fatal injury, death). The study provided insight into college students' understanding and interpretation of HBM constructs as they related to texting while driving. The second study by Knowlden and Sharma (2012) also focused on a sample of undergraduate university students ($n=150$, median age=19), but used survey methods to collect data. They found that the constructs susceptibility, benefits, barriers, and cues to action predicted both reading and writing text messages while driving; however, the strength of prediction varied depending on whether the outcome was reading or writing text messages.

Collectively, strengths of these five studies included what appeared to be adequate sample sizes for the methods used, although only the survey study included power estimates, and all four

included HBM constructs. However, the samples were generally not representative and the results cannot be generalized to any population. This is exacerbated by the use of highly select samples (i.e., students). In addition, the studies were cross-sectional measuring the predictors and outcomes at a single point in time. Therefore, true behavioral prediction was not achieved. Finally, standardized measures of the HBM constructs and behavioral outcomes were not used, though notably, the survey study included some prior consideration of how to operationalize the constructs.

Automaticity Theory

Priming is a process of implicit memory whereby exposure to one stimulus influences the response to another stimulus. Priming can be conscious or unconscious. Automaticity is the ability to execute a behavior or skill with little or no conscious thought. Priming often takes advantage of automaticity to change behavioral outcomes. Two papers from the review examined automaticity in relation to impaired driving or DDB. In the first paper, Ben-Ari (2012) reported on a series of studies that examined priming related to risky driving behavior including impaired driving and DDB. In their first study they found that positive emotion more than neutral emotion was associated with a greater willingness to engage in risky driving. Their second study showed that positive and aggravating conditions were associated with greater willingness to engage in risky driving compared to the neutral conditions. The third study showed that viewing the film *Fast and Furious* versus a nature film resulted in greater willingness to engage in risky driving among participants scoring higher on measures of anxiety and anger, and lower on patience. Finally, the fourth study provided evidence that viewing the film *Fight Club* versus a nature film was associated with greater willingness to engage in risky driving, and that thinking about the meaning of life compared with one's favorite food was associated with less willingness for risky driving. A strength of the study was that the research design had adequately sized samples; however, the measurement design was weak, based on single-item measures of each construct, and outcomes were limited to self-reported intentions and willingness rather than objectively observed behavior.

Bayer and Campbell (2012) undertook a study using constructs from the TPB in combination with automaticity to examine DDB in a sample of college students (n=441, mean age=18). Results suggested that the frequency of texting while driving was predicted by SN. In addition, to the examination of TPB constructs (attitudes towards behavior, SN, PBC, but not intention) they tested the role of automaticity and found it predicted both frequency of sending and receiving texts. Study strengths included the prediction of self-reported behavior, rather than intention, the operationalization of texting behavior as including both sending and receiving/reading messages, and the recruitment of a large sample. The study was weakened by the use of a cross-sectional, which limited conclusions regarding the prediction of behavior over time, and by testing the association of each theoretical construct with the outcome individually, thereby ignoring the collective influences of the constructs. Finally, the generalizability of the study is also limited due to the inclusion of a sample of students from a single university.

Prototype Willingness Model

PWM was mentioned in one study on impaired driving and one on other driving behaviors. PWM posits two types of decision making involved in health behavior choices: analytical processing, a reasoned process like that described by the TRA; and heuristic processing, a social

reaction that is image-based and arises from imagined social consequences of a behavior (Gibbons & Gerrard, 1997). Thus the model builds on concepts evident in TPB. Two additional constructs include risk prototypes that involve perceptions of people who engage in risk behaviors (e.g., the typical drunk driver), and behavioral willingness, which is a willingness to engage in a risky behavior (Gibbons et al., 2009). PWM assumes that health risk behavior is usually volitional but not necessarily planned; rather than being premeditated or reasoned, behavioral choices arise from reactions to conditions that present a health risk.

A British study on impaired driving (Rivis et al., 2011) tested constructs of TPB and PWM. Participants were 200 male drivers, including 100, 17-to-29-year-olds (median age=23) and 100, 30-to-60-year-olds (median age=46) recruited to complete a survey after being approached on the street. Constructs from the TPB and PWM explained impaired driving. impaired driving. Prototype perceptions were stronger predictors of behavior for the older sample and the interaction between prototype similarity and likeability improved the prediction. The research was limited to a cross-sectional design; however, sampling included a more representative sample than many studies using university students.

Reinforcement Sensitivity Theory and Revised Reinforcement Sensitivity Theory

Two studies reviewed used RST or r-RST to study driving behavior (one on impaired driving and other risky behaviors and one on speeding). RST/r-RST is biological model of individual difference in motivation (Corr, 2004). Three brain-behavior systems are posited to underlie individual differences in sensitivity to rewards and punishment; a BAS, a BIS, and a fight-flight system. The BAS is responsive to rewards and regulates approach behavior. The FFS consists of two responses; fight in response to an unavoidable threat and flight when escape was possible from a distal threat. With the revision, the FFS is proposed to be activated by punishment stimuli and consists of an additional response of freeze (i.e., a response which is activated when escape is unavoidable). The BIS is responsive to punishments and regulates avoidance behavior. With the revision, the BIS is considered responsible for resolving goal conflict between the BAS-FFS (competing reward and punishment cues), BAS-BAS (competing reward cues), and FFS-FFS (competing punishment cues). Harbeck and Glendon (2013) conducted a classroom survey of 165 young drivers in Australia (mean age=20) about several risky driving behaviors, including impaired driving, using constructs from RST. BIS, BAS-fun seeking, and BAS-reward responsiveness predicted perceived risk; reward responsiveness and perceived risk predicted self-reported risky behavior. Kaye et al. (2013) used r-RST to examine speeding behavior among 108 young Australian university students (mean age=24). They examined the influence of RST traits on words presented in gain-framed and loss-framed anti-speeding messages and how the processing biases associated with personality influenced message acceptance. Both BAS and FFS traits influenced message processing and message effectiveness. The FFS trait also influenced message behavioral intention ratings. The authors concluded that a range of road safety messages (i.e., gain-frame and loss-frame messages) could be designed which align with the processing biases associated with personality and which would differentially target people sensitive to rewards and sensitive to punishments.

Health Action Process Approach

HAPA was not mentioned in any studies on DDB or impaired driving but was mentioned in one study on seat belt use. HAPA includes three key components for change: adoption, initiation, and

maintenance that reflect motivational (development of intention) and volitional (moving intention to action) phases (Schwarzer, 2008). It also includes constructs that predict intention: risk perception (severity of risk); outcome expectancies (perception of outcome); and task self-efficacy (confidence in ability to perform initiation of behavior); intention predicts action planning (when, where, and how) and coping planning (anticipating barriers and alternative behaviors; also underpinned by efficacy). These planning stages predict the action phase which is a loop of initiation, maintenance, and recovery. HAPA was developed to expand upon theories that focus on predicting behavioral intentions rather than behaviors themselves (e.g., TPB), by suggesting a distinction between pre-intentional motivation processes that lead to a behavioral intention and post-intentional volition processes that lead to the actual health behavior (Schwarzer et al., 2007). Specifically, it posits that factors, such as planning and perceived self-efficacy, mediate the relationship between intentions and actual behaviors. The use of the HAPA model was examined across different behaviors including seat belt use (Schwarzer et al., 2007). In the study on seat belt use, a sample of 298 students in Poland age 16 to 21 (mean age=18.35, SD=1.06) completed questionnaires at three points in time. The model tested included three predictors of the behavioral intention (motivational self-efficacy, outcome expectancies, health risk perception) and three predictors of self-reported behavior (intention, recovery self-efficacy, planning). Results indicated that HAPA fit the data well and that in particular, strategic planning and self-efficacy were predictors of behavior. Risk perception was not found to be a significant predictor. The authors suggested that risk perceptions may be less important in preventive health behaviors (e.g., seat belt use) than in detection behaviors (e.g., breast examination or cancer screenings), and questioned the usefulness of fear appeals relying on them as stand-alone strategies. Rather, according to the authors, their findings point to the importance of making people aware of their skills and strategies (e.g., planning) to change behavior.

Social Cognitive Theory

SCT was not mentioned in any studies of DDB or impaired driving, but was mentioned in one study on speeding behavior. SCT posits that behavior results from observations of others (models). According to the model, a person's actions are guided by the observation of the model's behavior, the consequences, the context in which the behavior is undertaken, and interactions that occur (Bandura, 2011). Reproduction of a model's behavior can be explained by reciprocal determination, a triadic mutual interaction of personal determinants (efficacy), behavioral determinants (responses to the behavior), and environmental determinants (conditions or settings that facilitate behavior).

Scott-Parker et al. (2013) undertook research examining speeding behavior in Queensland, Australia. They used a model that they describe as combining SCT and PWM. Their sample included 378 participants 17-to-25-years-old from the general population. Measures included car ownership, punishment, attitudes, risk assessment, un/safe prototype, imitation, reward sensitivity, sensation seeking, willingness, rewards, anxiety, depression, intentions, differential association, and speeding during supervised driving (first stage of driver licensing). Results indicated that personal characteristics explained 20.3% of the variance in speeding, and that the combination of personal characteristics and social cognitive variables explained 41.1%, and the combination of personal characteristics, social cognitive variables and prototype willingness variables explained 53.7%. Significant predictors in the final model included gender, car ownership, reward sensitivity, depression, personal attitudes (consistent with Akers et al., 1979, SLT), and past behavior.

Strengths of this research included the application of more than one theory to span the hypothesized constructs involved, an adequately sized sample, strong prediction of the outcome behavior, and a strong measurement design. Weaknesses include a cross-sectional design, preventing cross-temporal evaluation of the association between the predictors and the outcome, and a non-representative sample.

Theory of Reasoned Action

TRA was examined in one study on impaired driving. TRA suggests that attitudes and SN shape behavioral intentions which in turn shape behavior (Ajzen & Fishbein, 1980; Ajzen & Fishbein, 1975). According to Gastil (2000), behavioral attitudes result from people's outcome expectancies (perceived likelihood of the outcomes of a behavioral choice) and outcome valuations (positive and negative valences of those outcomes). Subjective norms result from people's perceptions about the norms of significant others and their willingness to comply with the wishes of those significant others. TRA preceded TPB. The latter extended TRA by adding the construct of behavioral control (Madden et al., 1992). Using telephone survey data from a random sample of 1,259 adults, Gastil drew on TRA to predict the intention to drive while intoxicated. He found that overall study results supported TRA, with both attitudes and norms being predictive of DWI intention. However, contrary to expectations, social norms were a stronger predictor of DWI than attitudes and the perceived severity of penalties was positively correlated with DWI intention. The author concluded from these results that anti-DWI campaigns should focus on informal social influence rather than legal penalties.

Findings Relative to Other Health Behaviors

In addition to the theories described in the "Theories Fit" section, we identified a number of behavior change theories used to predict behaviors other than driving behaviors – namely health behaviors. These other theories may provide something of value for efforts to change DDB or impaired driving and are therefore summarized here. As seen in Table 5, no single theory stood out in our review of the literature: TPB and AT, which have already been described with regard to DDB and impaired driving, were each examined in two studies on health behavior. Eight additional theories were examined in a single study (or paper in the case of meta-analyses) each on health behavior. The 8 theories are presented below, beginning with TPB and then ordered alphabetically (i.e., EPPM, Health Action Process Model, IMB, PT, PMT, RFT, SDT, and SCT).

Theory of Planned Behavior

TPB was described fully above. TPB was examined in two studies of health behaviors. The first (Jekauc et al., 2015) used a sample of 101 college students (mean age=23) to examine the effects of TPB, as well as two other theories (physical activity maintenance theory and SCT) to predict exercise behavior (regular versus intermittent engagement in exercise). With regard to TPB, regular exercise participation patterns were associated with a positive attitude toward attending a fitness center and higher PBC. The authors cautioned, however, that results were not fully in line with the assumptions of TPB because behavioral intention, as an immediate and most important predictor, could not differentiate between regular attenders and intermittent exercisers. While all 3 theories had only modest predictive power, TPB had the lowest and SCT the highest. In the second study (Sniehotta, 2009), 579 Scottish undergraduate university students (mean age=23.2) received computer-delivered, persuasive messages to encourage use of recreational sports facilities. Participants were randomly assigned to behavioral, normative, or control belief

interventions. Pre and post surveys measured attitudes, SN, intentions, and behavior (with the primary outcome being number of weeks participants attended a facility). Support was found for changes in intention but not actual behavior. The author concluded that these results limit the theory's potential to contribute to the science of behavior change.

Automaticity Theory

AT has been used to explain health behaviors, particularly healthy eating. Papies et al. (2014) undertook a field study of goal priming whereby Dutch grocery shoppers were provided with a recipe flyer as they entered the store. The study examined the amount of snack food purchases of those handed a recipe flyer. Two samples were studied: shoppers who were overweight and shoppers who were not overweight. The total sample included 99 people, 94 of whom were women with a mean age of 53 years. The researchers found that fewer snack-food items were purchased by overweight shoppers who were given the healthy recipe flyer compared to the shoppers who were not overweight. The authors also reported that shoppers showed little awareness of the relationship between flyer receipt and purchasing. In related research, Xu et al. (2015) compared store purchase behavior between two groups; hungry and not-hungry undergraduate student participants. They found that the hungry group of students purchased more food as well as non-food items compared to those who were not hungry. Findings provided support for the ability of priming and automaticity to influence purchasing patterns.

Extended Parallel Process Model

As described by Witte and Allen (2000), EPPM posits that the evaluation of a fear appeal initiates two appraisals. The first is an appraisal of the threat of the issue from the message and the second appraisal involves an evaluation of efficacy of the recommended response. If people perceive the threat to be low (i.e., irrelevant or not significant), they will not be motivated to process the message further and will ignore the fear appeal. However, when they perceive the threat to be serious and relevant, their fear will motivate them to take action to reduce that fear; people's perceived efficacy will determine whether they try to control the danger (high efficacy) or conversely try to control the fear (low efficacy). Thus the theory suggests danger control occurs when susceptibility and severity are high and this produces mitigating behavior. Fear control occurs when efficacy is low. Even if susceptibility and severity are high, the individual attempts to control fear, which may not be productive. The theory defines self-efficacy as a confidence in one's own skills to perform a target behavior, response efficacy as a belief that the target behavior will control risk or mitigate harm, susceptibility as consideration of the likelihood of the threat, and severity as the magnitude of the threat. Witte and Allen conducted a meta-analysis of 93 studies on general fear appeals and concluded that strong fear appeals produce high levels of perceived severity and susceptibility, and are more persuasive than low or weak fear appeals. In addition, strong fear appeals coupled with high-efficacy messages produce the greatest behavioral change, while strong fear appeals coupled with low-efficacy messages lead to the most defensive responses. The authors concluded that fear appears to be a great motivator as long as people believe that they are able to protect themselves.

Health Action Process Approach

HAPA was previously described above. It was examined in a study on alcohol use by Murgraff et al. (2003). A sample of 128 female undergraduate psychology students (mean age=28) completed questionnaires at two points in time, with the primary outcome measure being single-

occasion drinking behavior at follow up. Results indicated that HAPA predicted a moderate proportion of such behavior, with self-efficacy for action control and action planning emerging as a significant predictor. Adding past behavior significantly increased the explained variance in drinking behavior. Behavioral intentions were not found to be a direct predictor of drinking behavior. Based on study results, the authors recommended that self-efficacy perceptions for action planning and action control be enhanced in intervention design for low-risk single-occasion drinking.

Information-Motivation-Behavioral Skills Model

IMB was originally used to describe HIV-related risk behaviors and suggests that information, motivation (personal and social), and behavioral (self-efficacy/confidence) skills predict behavior (Fisher & Fisher, 1992). Kalichman et al. (2008) tested IMB to examine safer sex motivation, using six motivational indicators (behavioral intentions, perceived social norms, perceived risk, ambivalence, self-rated motivation, and stage of change). Participants were part of a sample of 391 high risk men having sex with men at high risk for HIV transmission (mean age=35). Multivariate analysis results indicated self-perceived motivation to change and perceptions of risk were the two motivating markers that independently predicted engagement in high-risk sexual behavior. The authors concluded that their results offered limited support for IMB in that not all constructs predicted behavior. They noted that the study was limited by its reliance on self-reports of sensitive behaviors.

Prospect Theory

PT posits that people base decision-making on a heuristic for evaluation of the value of losses and gains rather than on the probability of the outcome (Kahneman & Tversky, 1979). Decision-making is considered a two-stage process, outcomes of a decision are considered relative to a heuristic. Decisions are made about possible outcomes and a reference point or value is set, with anything above the reference considered a gain and anything below considered a loss. In the second evaluation stage, behavior results from the computation of a value (utility) based on potential outcomes and probability. Kühberger (1998) conducted a meta-analysis of 136 studies on more general framing effects for risk choice problems framed as either gains or losses. The meta-analysis produced 230 single effect sizes which, overall, supported the framing effect. Two framing characteristics emerged as being especially important – risk manipulation and response mode. Regarding risk manipulation, a framing effect resulted from changing reference points but not manipulating outcome salience. Regarding response mode, choices were superior to ratings and judgments in producing strong reference point effects.

Protection Motivation Theory

PMT posits that people base decisions to protect themselves from health threats based on four factors: perceived severity of a threat; perceived probability that the threat will occur, or vulnerability to the threat; the efficacy/effectiveness of the preventative behavior in averting the threat; and their perceived self-efficacy to complete the preventative behavior (Rogers, 1975). In PMT, motivation to protect oneself against a threat arises from the appraisal of the threat (threat appraisal) and appraisal of the ability to cope (coping appraisal). Threat appraisal assesses the likely severity and seriousness of one's situation. Coping appraisal is an assessment of how one will respond to a situation, and includes both the difficulty in performing a preventive behavior and their self-efficacy to complete the preventative behavior. Floyd et al. (2000) conducted a

meta-analysis of research on PMT, which included 65 studies representing over 20 health-related behaviors (e.g., quitting smoking, wearing sunscreen, continuing exercise). The mean overall effect size was of moderate magnitude, with increases in threat severity, threat vulnerability, response efficacy, and self-efficacy generally shown to facilitate adaptive intentions or behaviors.

Regulatory Fit Theory

RFT is a goal attainment theory which suggests that goal pursuit is strengthened when it aligns with a person's values and beliefs (Higgins, 2005). The alignment of value in the approach toward the goal promotes commitment. A recent meta-analysis examined RFT within the context of peoples' evaluations, behavioral intentions, and behaviors in areas including persuasion, consumer purchasing behavior, social policy issues, and health issues (Motyka et al., 2014). A total of 215 studies were included (with 23,690 participants), spanning 16 years (1998 to 2013). Results indicated that the fit effect was robust and equally affected evaluation, behavioral intention, and behavior. In addition, it was found that behavior depended on the level of control, whether real or perceived, as well as on the influence of situational elements on the individual.

Self-Determination Theory

SDT focuses on the degree to which behavior is self-motivated or self-determined (Ryan & Deci, 2000). Three psychological needs are thought to motivate self-determination, including: competence or a desire to seek to control outcomes/mastery; autonomy or a desire to be the agent of change in one's own life; and psychological relatedness or a need to be connected to others. Ng et al. (2012) conducted a meta-analysis of SDT applied to healthcare and health promotion contexts. Based on an examination of 184 independent data sets, they found that the SDT constructs of practitioner support for patient autonomy and patients' experiences of psychological need satisfaction were related to beneficial health outcomes. The authors concluded that SDT was a worthwhile framework for studying antecedents and outcomes of motivation for health-related behaviors.

Social Cognitive Theory

SCT was described above. Jekauc et al. (2015) examined the effects of SCT, as well as the TPB and PAMT, using a sample of 101 college students (mean age=23) to predict exercise behavior (regular versus intermittent engagement in exercise). Results regarding TPB were presented above. SCT showed the highest predictive power followed by PAMT and TPB. The three variables of SCT – self-efficacy, perceived barriers, and social support by friends – all predicted exercise class membership. The authors noted, however, that the modest power of the 3 theories points to the need for an extension of the theories to include possible past behavior or affective determinants of behavior.

Theoretical Constructs

As can be seen from the previous section, many of the behavioral change theories identified in the literature share similar and, in some cases, identical underlying constructs. Abraham and Sheeran (2000) suggested that there are four broad categories in which most behavior-change theoretical constructs fit: attitudes (both affect and evaluative in nature); self-representation; norms (including injunctive and descriptive norms); and efficacy. It is important to note that

while most research studies incorporate many constructs, combinations of several constructs together are more likely to explain behavior. This is not to suggest that each construct must be represented in a single campaign. Instead, it suggests that there is some evidence to support the use of elements from several theories in designs, especially to address specific features within specific contexts. The following sections review the evidence related to these four construct categories of behavior-change theories considered according to the overarching framework of Abraham and Sheeran.

Attitudes

Attitudes reflect individual sentiments, ideas, or perceptions of the costs and benefits or rewards and drawbacks associated with behavior change. The performance of the target behavior is thus said to be positively (few costs, high reward) or negatively valued (high cost, little reward). Abraham and Sheeran (2000) consider two clusters of attitudes: affective attitudes and evaluative attitudes. The former reflects positive or negative emotional outcomes (e.g., one's own emotions such as anticipated guilt [Wang, 2016] or others' emotions [see empathic concern, Batson et al., 2007]). A practical example may be a campaign portraying a young adult who feels happy because he chose a bus ride home after drinking and consequently meets some friends on the bus. Such a campaign would focus on the positive emotional outcome rather than the material consequence. In contrast, evaluative attitudes are cognitive in nature and do not focus on emotion. A campaign using this approach might focus on the young adult thinking about the costs of getting caught, such as paying a fine, if he drove rather than taking the bus.

According to Abraham and Sheeran (2000), this reflects the ATB construct defined within TPB. Evaluations of behavior-related costs are most commonly considered in campaigns (particularly within the perspective of TPB). ATB is an evaluation weighted by a behavioral belief. That is, the strength or value of the belief affects the likelihood that the cost-benefit analysis has an impact on the intended behavior and ultimately the decision to act, and highlights the valence of the cost-benefit. This component highlights complexity in attitudes, and shows that the cost-benefit must be of relevance to the target people. This construct is reflected in several theories, including HAPA (Schwarzer, 2008), IMB (Fisher & Fisher, 1992) PMT (Rogers, 1975), PWM (Gibbons & Gerrard, 1997), and RFT (Higgins, 2005).

The examination of the broad area of evaluative attitude was considered as susceptibility to harm or a perception of the severity of the consequences or in the cues to actions that are typically represented in the EPPM or HBM (see Witte, 1994). EPPM suggests that high susceptibility and severity produce mitigating behavior, while high susceptibility and severity but low efficacy produce a fear control response. The HMB (Rosenstock, 1974) explicitly includes a benefits-barriers consideration. Fernandes et al. (2010) focused on speeding behavior as an outcome in their application of HBM. Regarding costs and benefits, they focused on short-term outcomes, including the cost of speeding as taking longer and the benefit of maintaining an appropriate speed as saving money on gas. Their study also combined an assessment of susceptibility and found that susceptibility could be general (overall crash risk) or specific (speeding related).

Strengths and Weaknesses

There are several strengths and weaknesses associated with the use of attitudes in campaign designs. One of the strengths is that a large body of research evidence shows at least some association between attitudes and behavior (e.g., Whissell & Bigelow, 2003). A second strength

is that there is a broad spectrum of attitudes associated with intended behaviors (although some attitudes and choices are more relevant than others depending upon the audience). In fact, attitudes were the most common construct in the studies reviewed, although many also considered injunctive norms (or perceived expectations of others) as a predictor of behavior.

While evaluative attitudes covered in campaigns can describe different outcomes to evaluate, the studies reviewed tended to present options for participants that focused on negative outcomes. That is, participants were asked to consider whether they agreed with particular negative consequences of behavior (e.g., getting caught), and these ratings were associated with participants' indication of how willing they were or how much they intended to undertake the behavior. In other studies, participants were asked to consider evaluative opposites. For example Marcil et al. (2001) had participants consider the degree to which outcomes of driving after drinking were good rather than bad, and pleasant rather than unpleasant. Prat et al. (2015) had participants consider whether texting and driving outcomes were unacceptable or acceptable, wise or unwise, unnecessary or necessary, safe or risky, useless or useful, and pleasant or unpleasant. Such research does not tease out the most appropriate targets for a campaign focused on attitudes but does suggest, overall, that attitudes could be appropriate to consider.

Several studies found a role for the evaluation of consequences in predicting risky behavior. For example, Gauld et al. (2014a, 2014b) found that evaluative attitudes such as the benefits of avoiding apprehension, being judged by others, being contactable by phone, or making texting errors predicted the intention to hide texting behavior (which was illegal in the jurisdiction under study). Attitude indirectly predicted behavior, such that it was only when the evaluative attitude was linked to a greater intention to avoid concealed texting that such people would report less concealed texting one week later. In addition, the attitudinal total score mixed consideration of the positives of texting with the negatives of texting and driving. Findings, however, highlight potential benefits to target some form of attitudes at least for young people.

Many of the studies reviewed had a heavy focus on students, particularly college students. For example, Hill et al. (2015) found that an evaluative attitude that caused drivers to regard multitasking while driving to be safe predicted a greater likelihood of phone use while driving. However, studies not using student samples had similar findings. For example, Åberg (1993) showed that the evaluative attitude, which would lead a driver to consider that a sanction is a likely consequence of impaired driving, predicted greater intention to avoid such behavior among a sample of drivers aged 18 to 54. Rowe et al. (2016) similarly focused on crash and enforcement-cost-related consequences in a study on speeding. These costs included costs of increasing the chance of getting in a crash, injuring others, injuring self, getting into trouble with the police, and annoying other road users, as well as benefits of looking good, getting a thrill, and getting to a destination more quickly. A total attitude score considering all these potential outcomes was associated with greater speeding behavior.

There were some instances where research-study participants rated affective attitudes. Moan and Rise (2011) included in their assessment of attitudes, a construct combining affective and evaluative attitudes of potential outcomes, such as being unpleasant or pleasant, foolish or wise, punishing or rewarding, and unnecessary or necessary. Participants were presented with the dichotomy at either end of a rating scale. Similarly, Rozario et al. (2010) had participants consider using a mobile phone as desirable or undesirable and harmful or beneficial. This too was predictive of cell phone use and driving. Other studies were less descriptive, using single terms (e.g., a good outcome) but across several contexts of cell phone use (see Walsh et al.,

2008). A good or bad dichotomy was used by others including Bayer and Campbell (2012), who also used wise or unwise and positive or negative. Generally fewer studies attempted to highlight clear attitudinal affective consequences from safe behavior or from risky behavior. While some studies examined affect, typically this appeared as a message-delivery technique. That is, affect was used to raise awareness or arousal, and thus receptivity, to a particular message.

Relevance to Driving Safety

The research evidence summarized in the annotated bibliography identified several studies of DDB and impaired driving for which there was evidence of the relevance of attitudes to the key behaviors. The overall evidence suggests that evaluation of greater incentives or fewer disincentives or both is associated with less risky behavior. One of the few studies that sought to develop and then evaluate a campaign in traffic safety involving attitude change was undertaken by Stead et al. (2005). They examined outcomes of a campaign to reduce speeding and found that the campaign was associated with significant changes in attitudes measured prior to and after the implementation of the campaign. The negative attitudes that were effectively changed included benefits around finding it difficult to stop in an emergency and costs of driving at what you feel is a comfortable speed. Other attitudinal variables measured included costs and benefits related to endangering pedestrians, causing an accident, getting caught for speeding, being able to keep up with the flow of traffic, and getting to the destination quicker. Other studies have included attempts to change attitudes, focusing on implementation (Angle et al., 2008) and one study which was implemented alongside enforcement efforts, showed behavioral differences in impaired driving rates relative to nearby regions (Jones et al., 2005).

Self-Representation

Self-representation refers to how people think about themselves or their internalized values (e.g., around morality). In considering how people think about themselves, there are several representations that could promote safe driving behavior. Some examples include representations of self as law abiding, as good parents or friends, or as safe drivers, whereby the moral importance of which is not to harm others. Theoretically, it reflects the motivation that people must match the concept of their ideal selves with their actual behavior. It can be considered as moral norms (Moan, 2013), self-esteem (Rosenberg, 1965), and as consideration of responsibility to act in the bystander intervention theory (Darley & Latane, 1968).

Strengths and Weaknesses

Self-representation suggests that action results from the internal standards to which people aspire. The motivation to alter behavior comes from the perceived discrepancy between one's ideal self or campaign-identified ideal and the current self. Campaigns using this approach can be effective if the components of self-representation included match those that the target population believes are relevant. However, a potential weakness of the approach is in the potential of selecting inappropriate internal standards in both the actual standard used and the strength of the standard. For example, if a person's self-representation is centered on always being available and responsive to texts, then this approach may not have the intended effect. This is likely why much of the evidence on self-representation influencing traffic safety has focused on concepts such as being a good friend or a responsible parent, as these are more globally valued.

Relevance to Driving Safety

Where studies focused on self-representation, the outcome of interest was often not a person's own risk behavior, but in preventing the risk behavior of others. Such a focus is still potentially worthwhile, as intervening in other's risk can have safety benefits for everyone involved (e.g., the driver, other occupants, occupants of other vehicles, pedestrians).

Research has also focused on intervening to prevent another person from driving after drinking, and there is evidence that a self-representation of being responsible, particularly for those in close relationships (e.g., roommate, spouse) is associated with greater willingness to intervene. In campaigns that seek to target self-representation; that is, the way a person sees himself or herself particularly as someone who is responsible for the safety of others, may be an appropriate target for self-representation theory. Buckley et al. (2016) note that research evidence suggests that intervening behavior is likely with the addition of other constructs, including the person identifying the traffic behavior as dangerous (or having costs) and having the confidence or efficacy to intervene. This also fits with the Darley and Latane (1968) model of bystander intervention.

As a reflection of self-representation, Moan et al. (2011, 2013) included moral norms in their study as a belief that it is wrong to ride with a driver who has been drinking or to drive after drinking. Moral norms appeal to a person's representation of what is ethically right or wrong. A study by Atchley et al. (2012) focused on understanding young drivers' perspective on moral norms about responsibility more generally, comparing DDB and impaired driving behaviors. They found that a texting driver was considered to be the most responsible for a crash, however, more severe punishment was considered appropriate for an alcohol-impaired driver. They also found differences in the perceived driver's responsibility depending upon whether other aspects of the crash scenario were described in the example (e.g., icy or clear conditions or minor or severe injury consequences), highlighting the importance of context. In related research, Waddell & Wiener (2014) found that cell phone use (making a call, receiving a call, sending a text, reading a text) were all predicted by moral norms supporting safe behavior. Again, these studies on moral norms were part of a larger analysis that included other TPB constructs that together showed greater ability to explain behavior.

Where the focus was on people and their traffic safety behavior, Evans and Norman (2003) included a construct of whether teens see themselves as safe pedestrians (i.e., I like to think of myself as someone who always thinks carefully about how to cross the road and I like to think of myself as a safe pedestrian). This concept of self-identity as a safe pedestrian contributed additional variance to attitudes toward the behavior, SN, and PBC in predicting intended safe pedestrian behavior. Further, the meta-analysis of SDT presented in the annotated bibliography includes support for the construct of autonomy in explaining health behavior (Ng et al., 2012). Within this construct, there is a consideration of a desire to behave in accordance with one's sense of self (Deci & Ryan, 2011, Ryan & Deci, 2000). The meta-analysis demonstrated support for the construct predicting health behaviors although it did not include studies in driving safety.

A meta-analysis of research examining RFT (Higgins, 2005) also suggested that there is strength in the approach of developing messages that highlight the ideal self. Regulatory fit has been considered to increase message persuasion (Cesario et al., 2004; Lee & Aaker, 2004), suggesting that framing a message in a way that fits with the orientation of the target audience is important. Lee and Aaker (2004) suggested that regulatory fit may operate by causing people to feel the

message was right for them or to feel that their reaction was right because it fits with their sense of self. Again, this work was not directly undertaken in driving safety but does suggest that there needs to be some initial alignment between the campaign's proposed ideal and the target population's current beliefs.

Norms

Injunctive norms rely on the individual desire to be accepted by important others and reflects a perception that a particular behavior will increase the approval from others or prevent disapproval (e.g., Kenney et al., 2013). Important others include parents, spouses, or close friends. However, whether a particular person is important to the individual depends strongly on context. Hence, a person that one barely knows might not qualify as an important other in most situations, but that person might become important if he or she gains control of an outcome that the individual desires (Lapinski & Rimal, 2005). Descriptive norms differ from injunctive norms and reflect a person's perception of how others behave and what others generally accept as appropriate; these often relate to a specific group. One such descriptive norm promotes the idea that fraternity members drink a lot. Norms may facilitate behavior by providing a model individual or group (Bandura, 2011), cues to action (Rosenstock, 1974), or the internalized expectation that a behavior is acceptable or unacceptable to an important other as is reflected in the construct of SN (Ajzen, 1991; Gibbons & Gerrard, 1997). They can also reflect an innate need to be connected to others, or a psychological relatedness (see SDT, Ryan & Deci, 2000). The construct of norms has thus been considered in concert with other constructs, as defined in such theories; however, norms have also been studied on their own including both injunctive and descriptive norms.

Strengths and Weaknesses

Campaigns that take a norms-based approach have several strengths. First, norms are perceptions that can be altered or corrected by persuasive or convincing information, such as the results of research or the opinion of a popular or important person. Injunctive norms, in particular, can have a strong influence on behavior, as they relate to the very basic human need to be accepted. Second, approaches targeting descriptive norms have demonstrated effectiveness (Borsari & Carey, 2003). Third, norms-based approaches can be readily applied in mass communications through television or radio ads, billboards, sidebars on social media sites, and others.

Norms-based approaches also have weaknesses. First, the prevalence of the target behavior is not always considered, even though it has important implications. For example, prevalent behaviors such as cell phone use while driving will not be reduced by information that states that a high percentage of drivers engage in it, and in fact, could have the unintended effect of encouraging those who avoid cell phone use while driving to take up the behavior. Alternatively, if the behavior is rarer than it is generally perceived to be, correct information stating that it is rare may encourage others to change their behavior to be more in line with norms. Such considerations also highlight the importance of understanding the context; to strengthen the value in a norms-based approach it is thus relevant to understand the target audience and the peer group from whom they derive the norms. Russell et al. (2005) highlights the challenges of making norms messages relevant. Their qualitative study examining possible reasons for an effective campaign found students were confused about the norms-based message.

Given that much of the norms-based research on traffic safety targets young adults, the typical focus has been the approval of friends (e.g., Gastil, 2000, regarding impaired driving). However, some studies targeting injunctive norms asked participants to consider people important to them (e.g., Åberg, 1993; Castanier et al., 2013). Beck and Watters (2016) also employed a more general approach in which participants were asked to consider the person most important to them in their social circle. While potentially appealing to a broader group of participants, this approach fails to inform campaigns where specificity is important (Hardeman et al., 2002), such as in many traffic safety campaigns, and also runs the risk of failing if too many people consider an important person who values the unsafe behavior (e.g., a teen driver considering his friend who respects people who drive fast).

According to Lapinski and Rimal (2005), a norms approach can be enhanced by (i) clear identification of what is meant by norms (e.g., injunctive versus descriptive), (ii) understanding factors that moderate the influence of norms (e.g., attitudes), (iii) addressing the way in which norms can be communicated within a community (e.g., who are the referent people or groups), and (iv) understanding the context and attributes of a behavior that make norms more or less relevant (e.g., where behavior may be undertaken in private).

Relevance to Driving Safety

Several studies have suggested that norms, both injunctive and descriptive, are relevant to driving safety (e.g., Benson et al., 2015; González-Iglesias et al., 2014; Song et al., 2012). For example, Benson et al. (2015) sought to identify relationships important for drivers and driving behaviors. They found that family, friends, police, and other drivers were most likely to disapprove of texting and driving. However, in a follow-up study, only the approval of family and friends predicted texting-and-driving intentions. González-Iglesias et al. (2014) found that peers' approval but not parents' predicted impaired driving. Song et al. (2012) showed that perceptions of peer, parent, and community values were related to the likelihood of impaired driving. Those who believed their community cared a great deal about underage drinking were less likely to report impaired driving or riding with a driver who had been drinking. Similarly, believing that parents would talk to them (rather than yelling or shouting at them) about drinking reduced the likelihood of impaired driving. Further, the belief that friends drank and got drunk was associated with a greater likelihood of impaired driving, as was believing that friends' parents would provide alcohol. Kenney and LaBrie (2013) also noted that an overestimation of others' approval was associated with impaired driving.

Some studies have combined both injunctive and descriptive norms into a single construct. For example, Wang (2016) included items indicating that a friend thinks the study participant should intervene when a driver is texting, but also that most college students intervene. The collective score of norms demonstrated predictive value in intended intervening. Waddell and Wiener (2014) predicted intended cell phone use while driving by having a general sample of drivers consider people important to them with regard to their approval of using a cell phone and driving, wanting them to use the cell phone while driving, and thinking that they should use the cell phone while driving. In this study, separate variables of descriptive norms were included for the perceived behavior of friends, family members, and coworkers. All components of norms predicted cell phone use while driving.

Evaluation studies provide the strongest evidence for the relevance of theoretical constructs. Clayton et al. (2006) examined responses to a roadside message of please hang up – I care, with

thank you on the reverse side of the sign. An observation study of drivers around the sign showed that 6% were using their cell phone on approach to the sign and 28% of these people hung up upon seeing the sign (this increased to 33% the second year). However, 36% were observed to reengage their use of the phone immediately after passing around a corner. The authors concluded that the intervention had little effect.

One of the strongest evaluation studies of a theory-directed campaign across a wide community targeted norms. The community-evaluation study compared reports of impaired driving across a region in Montana where the campaign was implemented with reports from other regions in the state where the campaign was not implemented. A key message of the campaign was, Most Montana young adults (4 out of 5) don't drink and drive. The intervention group showed greater recall of the message, lower misperception of the normative behavior, increased safe behavior (use of designated drivers), and lower impaired driving (Perkins et al., 2010).

Efficacy

Efficacy is a commonly targeted construct in research studies of driving safety behavior but is less often considered in campaigns (Lewis et al., 2007). Efficacy might also be termed *PBC*, *self-efficacy*, or *confidence*, and, in essence, reflects peoples' beliefs in their skills and abilities to perform a particular behavior. It is reflected in several behavior-change theories (see, Ajzen, 1991; Bandura, 2011; Rogers, 1975; Rosenstock, 1974; Ryan & Deci, 2000; Schwarzer, 2008; Witte, 1994). The behavior under consideration may be a safe behavior (e.g., planning an alternate method of getting home after drinking), or it may reflect an avoidance behavior (e.g., not driving after drinking), or the actual risk behavior (e.g., driving while talking on a cell phone).

Strengths and Weaknesses

Efficacy can be considered in a general or specific sense. That is, one can have a general confidence or one can have confidence to perform a specific task. Some studies frame confidence to perform an alternative safe behavior, such as planning ahead with alternative transport when planning to drink or may represent a confidence to avoid impaired driving, without directly specifying a task. Ajzen (1991) argued that the greater the specificity of the behavior, the greater likelihood it would predict the behavior. In practice there have been several considerations. Hill et al. (2015) found perceived efficacy to multitask predicted greater DDB. Rozario et al. (2010) specified contextual conditions of cell phone use and driving, including driving while alone or with others and when the contact on the phone was perceived urgent or not. In all contexts studied, efficacy was predictive of the behavior but in contrast, injunctive norms were only predictive in the driving with others condition. Castanier et al. (2013), however, found efficacy was a moderator for other TPB constructs in predicting behavior. That is, having greater efficacy meant that SN played a role in predicting impaired driving. impaired driving. Efficacy was also relevant for those not yet driving. Rowe et al. (2016) showed efficacy was predictive of intention and subsequent behavior (at driving age) for both impaired driving and talking on a cell phone while driving when students were initially assessed prior to licensing age.

Relevance to Driving Safety

Several studies found that DDB and impaired driving and efficacy were associated with one another. Gauld et al. (2014ab) found efficacy contributed to the statistical model predicting trying to conceal texting while driving. Moan (2013) found that having less efficacy contributed to the prediction of intended riding with a driver who had been drinking. González-Iglesias et al. (2014) similarly showed that efficacy was relevant regarding intended avoidance of impaired driving among Spanish students. In this study, a sensation-seeking personality was also predictive, while in most of the other studies reviewed, efficacy was considered within the model of TPB and combined with norms and attitude.

One review focused on DDB studies examining actual cell phone use and driving and perceived ability to drive safely and use a cell phone (Cazzulino et al., 2014). Conclusions from simulator studies were that a strong belief in one's ability to multitask was associated with greater impairment during simulated driving. Additionally, young drivers were typically observed to be the poorest in terms of behavioral measures, but they had greater confidence in their ability compared with older drivers. The review concluded that this discrepancy between ability and confidence in performance may go some way in explaining why drivers continue to drive while using their cell phone, despite simultaneously acknowledging that it is generally risky.

Evaluation of Campaign Studies

Overview

The literature review generated several articles regarding the assessment of the design or implementation of a campaign. Information regarding how theory was used to evaluate the campaign or how theory was used to develop the campaign or campaign material are found in this section. Several other articles describe controlled experiments in which theory or theoretical constructs were studied to determine their role in campaign messaging.

Theories

Findings relative to distracted driving behavior and impaired driving

Nine studies examined or mentioned behavior change theories within the context of DDB or impaired driving. The only theory mentioned in more than one study was TPB (four mentions); all other theories were mentioned in a single study. Each mentioned theory is discussed below, beginning with TPB and then in alphabetical order by theory.

Theory of planned behavior

TPB was used in the design, implementation, and/or evaluation of four articles in this section of the literature review. TPB provided the guiding framework for the development of campaign material which focused on reducing speeding behavior in Scotland (Stead et al., 2002, 2005). Empirical evidence supported the use of TPB as the theoretical foundation of the advertisements developed and implemented in the campaign. Results showed significant changes in attitudes and beliefs about speeding behavior. A third study was an evaluation of a school-based impaired driving intervention in which the goal of the study was to examine which message (emotional, factual, or a combination of both) had the greatest effect on the constructs in TPB (Warner & Forward, 2016). Results showed that the combination of emotional and factual messaging had the largest effect, and attitude was affected most by the intervention. The final article used TPB

as the theoretical model for the analysis of the results of a pre/post questionnaire evaluating the impact of an impaired-driving campaign and seat belt use campaign (Nathanail & Adamos, 2013). Alternative models were developed for correlating behavior and intentions with TPB constructs, and found an increase of the predictability of the models as more constructs from TPB were added. These findings underscore the importance of using TPB in its entirety rather than segmenting its constructs. Based on the studies outlined in this section, the use of TPB has been found to be a promising approach to developing, implementing, and evaluating effective traffic safety campaigns.

Emotion information management

According to Taute et al. (2010), EIM draws on the emotional intelligence literature and is comprised of three emotional competencies: recognition of emotions, regulation of emotional responses, and empathy. The theory is used to assess how emotional advertising can be affected by a person's ability to manage emotional information. Particular attention is given to the effects of emotional advertisement content on behavioral intentions and attitudes toward the advertisement.

Taute et al. (2011) evaluated EIM as a person trait that influences how people manage affect as information and the degree to which this trait can explain consumer responses to both positively and negatively valenced advertising. The article presents a conceptual EIM-Advertising Response Model comprised of emotion recognition, positive emotion use, negative emotion management, empathy, attitude, and behavioral intentions. A sample of 280 college students were shown two television PSAs, one used humor to influence attitudes and intentions, and the other used disastrous outcomes of impaired driving to produce negative emotions. Attitudes toward the ad and behavioral intentions to comply were measured following the viewing of each PSA. Survey results demonstrated the efficacy of EIM for explaining how emotional appeals affect attitudes toward the ad and behavioral intentions to comply with both positively and negatively valenced impaired-driving commercials. Those who were able to better manage negative emotion were less affected by a negative campaign.

Elaboration likelihood model

ELM provides a general framework for organizing, categorizing, and understanding the basic process underlying the effectiveness of persuasive communications (Petty & Cacioppo, 1986). The model aims to explain different ways of processing stimuli, why they are used, and their outcomes on attitude change. The ELM proposes two major routes to persuasion: the central route and the peripheral route. The central route of persuasion involves a high level of message elaboration in which there is careful and thoughtful consideration of the true merits of the information presented. The peripheral route occurs as a result of a person's association with positive or negative cues in the stimulus and does not require scrutiny of the true merits of the information presented (e.g., attractiveness). The central route appears to have more enduring impacts on behavior change than the peripheral route.

ELM was used by Lewis et al. (2008) as the basis for studying message-relevant effect of impaired-driving campaigns. A sample of 201 participants viewed two impaired driving advertisements, one depicting positive emotional appeals and another with negative emotional appeals. Participants completed a questionnaire to assess attitudes and behavior prior to watching the advertisement and immediately following the advertisements were surveyed about attitudes and intentions. A second questionnaire was completed 2 to 4 weeks later to assess attitudes and

behavior. The results show evidence of greater persuasiveness of negative appeals immediately after viewing the ad, but greater improvement of positive appeals over time. While many campaigns use negative appeals, these findings support the idea that positive appeals may have a lasting, stronger benefit on behavior change over time.

PRECEDE-PROCEED model

The main purpose of PPM is to provide a structure for applying theories and concepts systematically for planning and evaluating health behavior change programs (Gielen et al., 2008). PRECEDE is an acronym for: Predisposing, Reinforcing, and Enabling Constructs in Educational/Environmental Diagnosis and Evaluation. The PRECEDE framework was developed in the 1970s due to the concern that too little emphasis was placed on strategically designing interventions to meet the needs of the population. PROCEED is an acronym for: Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development and was added to the PRECEDE framework in 1991. The newest version consists of four planning phases, one implementation phase, and three evaluation phases.

Ebel et al. (2003) evaluated a multifaceted community education campaign to increase booster seat use among children 4 to 8 years old. Campaign messages were designed based on the PPM of behavior change, identifying predisposing, enabling, and reinforcing factors affecting booster seat use. Findings from focus groups, the King County Booster Seat Coalition, and a parent feedback committee were used to design campaign material. Results from pre/post observational studies showed a significant increase in booster seat use among the intervention communities.

Regulatory fit theory

Pierro et al. (2013) built upon the theory of regulatory fit (Higgins, 2005) by examining whether participants' self-regulatory orientations moderated the impact of one-sided vs. two-sided messages on peoples' intention to reduce driving speed. Two studies were conducted; strong locomotion or strong assessment orientations were situationally induced in Study 1, and were measured as chronic individual differences in Study 2. In both studies, participants were presented with printed advertisements in either a one-sided or a two-sided format. The advertisements were developed only for the purpose of this research. As the authors predicted, both studies found that for participants high in assessment, two-sided advertisements were more effective than one-sided advertisements, as reflected in stronger engagement with the persuasive message and stronger intentions to reduce driving speed. In contrast, for participants high in locomotion, one-sided advertisements were more effective than two-sided advertisements. There was also evidence that engagement strength mediates the relation between fit and intention to comply with the persuasive message, which is consistent with regulatory fit theory. Levels of locomotion and assessment vary across cultures, therefore the type of messaging used could be tailored to the predominate culture of the country.

Social judgment theory

SJT posits that the effect of a persuasive message on a particular issue depends on the way the receiver evaluates the position of the message (Sherif et al., 1965). A person's position on an issue depends on: the person's most preferred position (their anchor point), the person's judgment of the various alternatives (spread across their latitudes of acceptance, rejection, and noncommitment), and the person's level of ego-involvement with the issue. SJT can be used in

the design of campaigns to determine the latitudes of acceptance, rejection, and noncommitment to ensure messaging is persuasive and credible.

Smith et al. (2006) evaluated a social norms approach campaign to reduce risky drinking behaviors by a representative sample of undergraduate students. The campaign was developed based on SJT. Messages designed around SJT constructs (latitudes of acceptance, noncommitment, and rejection) were presented in the school newspaper, posters throughout campus, cafeteria table signs, and the orientation news magazine. Messages were revised throughout the campaign based on self-reported drinking measures via web-based surveys. Results showed the gap in perceived versus actual drinking was greatly reduced, the difference in the perceived number of drinks consumed significantly reduced, and self-reports of consumption of five or fewer drinks significantly increased. The results provide evidence for the importance of using SJT in the development of campaign material and to use an iterative process to ensure messages are high in believability.

Findings Relative to Health Behaviors

Only one study reviewed in this section examined a specific theory regarding health behavior. That study is described below.

Extended parallel process model

LaVoie and Quick (2013) evaluated *the truth* anti-smoking campaign using EPPM. Eighty-six television advertisements were analyzed and coded based on the components of EPPM. The authors found that all campaign advertisements heavily relied on severity and susceptibility to make fear appeals to motivate behavioral change, however, the advertisements offered no recommended response by way of self-efficacy and response efficacy. The authors argue that all four components of EPPM must be used to effectively produce behavior change and concluded that without response messages, *the truth* campaign is much less likely to be successful.

Constructs

The categories of theoretical constructs identified earlier (i.e., attitudes, self-representation, norms, and efficacy; and the “Theory Fit” section) are incorporated into many different theories and often play a significant role in the development and implementation of traffic safety campaigns as well as their evaluations. Several studies in the literature review highlighted the aforementioned constructs as major components of the development and evaluation of the campaign. Studies not already discussed in the “Theoretical constructs” section or elsewhere in the letter report are summarized here.

The *THINK!* campaign was an intervention aimed at reducing impaired driving among males 17 to 29 years old. The intervention highlighted the personal consequences of impaired driving using television and cinema advertisements, radio advertisements, and posters. The theoretical constructs of attitude and perceived risk played a role in the evaluation of the campaign. Angle et al. (2008) conducted pre/post surveys to assess changes in attitudes toward impaired driving and perceived risk of impaired driving. Results showed there was little or no change in the perceived safety or acceptability of impaired driving, perceived likelihood of getting caught by the police, perceived consequences of impaired driving, or likelihood of consequences of impaired driving.

Jones et al. (2005) reported the use of focus groups to aid in the development of campaign material. Reaction of the focus group suggested that messaging should focus on the financial

costs of impaired driving. A pre/post survey was conducted to assess attitudes toward impaired driving. The researchers believe the campaign was successful in communicating the financial cost of a citation for driving under the influence. The most important indicator of this was that 50% of men 21 to 34 reported that a DUI would cost them over \$8,000, compared to a perceived cost of only \$1,000 before the campaign. Results were not provided for any other survey questions; therefore it is not possible to know how attitudes changed over the course of the campaign.

Satterlund et al. (2012) examined how smoking behaviors and attitudes toward smoking changed over time after the adoption and implementation of California's indoor smoke-free law. Three ethnographic studies were conducted at stand-alone bars to collect qualitative information about attitudes and perceptions of the smoke-free ordinance. A total of 309 bars were visited and observed on at least 3 occasions, and 242 semi-structured interviews were conducted with bar personnel, patrons, and anti-tobacco advocates and officials who implement and enforce the law. The authors found that the enforcement of smoke-free indoor bars eventually created a shift in normative beliefs despite initial resistance.

Optimism bias also came up in two studies in this section of the review. Harré et al. (2005) conducted a controlled experimental study to assess the effects of different advertisements on optimism bias in a sample of college students. They used the term crash-risk optimism to refer to the accurate or inaccurate perception of being at less risk in relation to one's peers. A sample of 173 young drivers watched advertisements that showed drinking and dangerous driving resulting in a crash, while 193 others watched advertisements that showed people choosing not to drive after drinking. There was evidence of an inflated sense of superior driving in the participants who watched advertisements showing dangerous driving resulting in a crash, compared with the control group. There were no differences found between groups regarding crash-risk optimism. Similarly, Ayers and Myers (2012) investigated the effects of a media health message for drinking on comparative optimism. Sixty-five young adults watched an anti-drinking scenario. There were 2 intervention conditions: 30 participants imagined they were part of the scenario, and 35 watched the scenario. They then completed four comparative optimism estimates comparing themselves to those of the same age and gender with similar drinking habits. A control group of 59 participants completed questionnaires only and were not shown the anti-drinking scenario. Participants in the two experimental conditions were significantly less comparatively optimistic for getting into a car crash than the control condition.

Two studies focused on negative consequences of impaired driving without specifying a theory or construct. In the first study, Zampetti et al. (2013) described a community-based campaign in which 20 jurisdictions were provided a basic road safety program, with 12 of those jurisdictions receiving a more intensive program. The basic program contained various material emphasizing negative consequences of impaired driving and DDB that were dispersed throughout the community via posters, press conferences, radio and television advertisements, and a website dedicated to the program. The more intensive program also included involvement of schools, firefighters, and police, as well as a 1-day community conference open to the public. The goal of the programs was to decrease the incidence and severity of injuries. Injury data were collected from discharge reports and hospital admission records for June to August 2003 and June to August 2008. Although there was an overall downward trend in injuries, results showed no significant difference in incidence or severity of injuries between the basic and intensive program groups. The article states the focus of the program was to highlight negative

consequences of impaired driving and DDB, however, there was no mention of a specific theory or constructs used in the design, implementation, or evaluation of the campaign.

In the second, Block (2005) conducted two controlled experiments with college students to assess attitudes toward a one-page ad on impaired driving describing the negative consequences of impaired driving and recommendations for a designated driver. The research centered on the self-referencing effect. The participants were divided into two groups: (1) independent self-construal, which are those students that identify as American and (2) interdependent self-construal, which are those students that identify as Asian. For those with an independent self-construal, a self-referencing advertisement produced greater guilt but another referenced advertisement produced greater fear. Those conditions were equal for students with an interdependent self-construal. While this article did not focus on evaluation of a campaign, the results may be helpful in the development of campaign material for impaired driving. Specifically, the findings of the studies highlight the importance of cultural identity when developing message content.

Other Evidence of Theory

Overview

The literature review yielded several articles that were commentaries, reviews, meta-analyses, and other types of papers that were not direct, empirical evaluations of theories or campaigns. Many of these articles provided additional evidence of the utility of health behavior change theories not captured in the articles discussed in earlier sections of this report. Further, a few review papers discuss additional theories. In this section we present an overview of these papers. None of the articles for this section addressed DDB, three addressed impaired driving in some way, a few included unsafe driving behaviors (speeding, risky driving, adolescent seat belt use), and the remainder addressed either specific non-driving health behaviors or a set of health behaviors.

Findings relative to impaired driving

Buckley et al. (2016) conducted a systematic review of studies related to intervening behavior among young people 16 to 25 years old in impaired-driving situations, using the TBI. According to the paper, the theory suggests that there are five steps in effective bystander intervention: noticing the event; correctly interpreting the event; taking responsibility to act; efficacy (perceived ability and confidence to intervene); and intervening (acting). The review included 10 articles spanning 1999 to 2014. Articles were summarized based on support for the five steps in the TBI. Overall, the review supported the theory; that is, evidence supported the validity of the theory components and supported the use of this theory as a framework to aid in the identification of factors that could be addressed by a campaign to increase bystander intervention and decrease impaired driving among adolescents. The authors point out that two underlying factors that can impact these steps still need additional research: diffusion of responsibility (the typical effect of a lower likelihood of intervention with more bystanders may not hold when the bystanders are friends and family); and impairment of the intervener.

An article from Canada (Cismaru et al., 2009) reported on a review of social marketing campaigns targeting impaired driving in relation to PMT. The article also discusses how PMT can be used to develop effective campaigns for the prevention of drunk driving. The review found 25 campaigns/programs designed to reduce impaired driving. Of these

campaigns, 5 did not use any components of PMT, 15 included some components of PMT (generally self-efficacy, threat severity, and perceived vulnerability), and 5 included most or all components. Based on these results, the article argues that PMT has been used successfully in social marketing campaigns (the authors note, however, that there are no evaluation data showing the effectiveness of any of the campaigns) and that PMT can be an appropriate framework for designing an anti-impaired-driving campaign. The articles recommend that campaigns focus on the PMT constructs that are important for behavior change—perceived vulnerability, severity, response, and self-efficacy—noting that most campaigns did not focus on all constructs.

Gibbons et al. (2009) argued that expectancy-value theories (deliberate decision making) are better at predicting health promoting behaviors (e.g., UV protection), while dual-processing theories (less reasoned or premeditated) are better at predicting risky health behaviors among adolescents (such as drunk driving). The article presented the PWM as a dual-processing model that posits two interrelated pathways for information processing that work in parallel. One pathway involves analytical, in-depth processing while the other is based on heuristics. Details of this model have been described earlier in this report.

Findings relative to other driving behaviors

Five studies from the annotated bibliography addressed driving behaviors, at least in part, in relation to a health behavior change theory or construct. A wide range of theories and constructs were addressed in the articles.

Researchers from the United Kingdom and Australia (McEachan et al., 2016) conducted a meta-analysis of studies using the reasoned action approach for understanding health-related behaviors. RAA builds on the TPB which posits that health behaviors result from a person's intention and PBC. Intention motivates the behavior, and control refers to how much control or confidence one has in engaging in the behavior. Intention is determined by attitudes and norms. In RAA, intention is determined by experiential attitude, instrumental attitude, descriptive norms, and injunctive norms. Perceived behavioral control consists of capacity and autonomy. The meta-analysis included 74 articles that addressed a wide variety of health-related behaviors including 2 that addressed speeding at least partially and another that addressed the protective factor of safe driving. The results showed that all components of RAA, except autonomy, were significant predictors of behavioral intent. The authors concluded that the RAA components are useful for understanding and predicting health behavior.

Brewer et al. (2016), conducted a meta-analysis on the construct *anticipated regret* and health behaviors. According to the authors, regret is an unpleasant cognitive emotion that is experienced when thinking about one's current situation and realizing or imagining that their situation would have been better if they had made a different decision in the past. Anticipated regret can result from both action and inaction, with inaction leading to stronger regret over the long term. The analysis included 81 studies that addressed a variety of health behaviors, including a few on speeding/unsafe driving. The study found that anticipated regret was significantly associated with behavioral intentions and this association was strongest for physical activity and speeding/unsafe driving. Greater anticipated regret from not engaging in behavior (inaction regret) was a stronger predictor of intentions and behaviors. The article concluded that more research should be conducted to understand how anticipated regret differs from similar

constructs, its role in health-related behaviors, and how it can be used to develop and improve health behavior interventions and campaigns.

Sutton (2008) presented a commentary on the HAPA continuum version (HAPA-C), using adolescent seat belt use as an example. HAPA has been described earlier in this report. A particularly salient discussion in the commentary focused on the implications of HAPA-C for intervention. The author states: in order to change seat belt use, we need to change planning and/or recovery self-efficacy; to change recovery self-efficacy, we need to change motivational self-efficacy; to change planning, we need to change intention and/or recovery self-efficacy; and to change intention, we need to change one or more of: motivational self-efficacy, outcome expectancy, and risk perception (Sutton 2008, pg. 71). The author concludes that based on this model, interventions targeting motivational self-efficacy could increase seat belt use via three pathways.

Blalock and Reyna (2016), conducted a literature review of articles that applied FTT to decision making regarding health behaviors. FTT is a judgment and decision making model that proposes that when a person is exposed to significant information, two types of memories are recorded: a verbatim representation and a representation that is one or more gists (or the essential meaning of the information without specific details). When making decisions, people use both types of representations and the different types of information might lead to competing decisions. FTT predicts that people have a tendency to rely on gist, particularly as they develop more expertise on a topic. The literature review included 42 articles, 6 of which were on the topic of risky behaviors including speeding (the remainder focused on clinical/patient decision making and eating disorders). Among these six studies, the results showed that gist-based reasoning was most often associated with risk-avoidance, while verbatim-based reasoning was associated with risk taking.

One other study in this section of the annotated bibliography addressed traffic-safety-related behaviors, at least in part. Todd et al. (2014) conducted a meta-analysis of the PWM and a variety of health behaviors. In the context of the model, the prototype is a mental model of a typical person engaging in the health behavior. The study's aim was to assess the role of the heuristic pathway and intentions in predicting health behaviors. The analysis included 81 studies, including a few on risky driving. The study found that PWM was supported and explained about 20% of the behavior variance. The strength of associations depended on the health behavior, with the strongest association found for alcohol use (there were too few studies on risky driving to be a part of this analysis). Age was also a moderating factor with PMT best predicting behaviors of adolescents.

Findings relative to health behaviors

A literature review by Baban and Craciun (2007) addressed theories and models that underpinned successful health behavior interventions. Eight theories were included in the review: HBM, PMT, TPB/TRA, SCT, II, TTM, HAPA, and PAPM. Six of these theories have been defined previously in this report. The other two (II and PAPM), we briefly define here. According to Baban and Craciun, II is a behavioral motivation model that posits that people use a self-regulatory strategy to move from a behavioral intention to performing the behavior. The strategy takes the form of I intend to do X at time and place Y. Data shows that people who make these specific plans have a higher likelihood of changing their behavior, presumably because having specifics about time and place helps people overcome difficulties of starting the

new behavior. PAM is a stage theory of behavior change with seven stages (Baban & Craciun, 2007). These stages are Stage 1—people do not know anything about the behavior; Stage 2—people are aware of the behavior but not engaged; Stage 3—people are engaged and actively making a decision; Stage 4—the decision is made not to change behavior at that time; Stage 5—the decision is made to change behavior; Stage 6—behavior change is initiated; and Stage 7—the behavior change is maintained. In their analyses of the 8 theories, the authors concluded that some theories led to better interventions (in terms of behavior change) based on the behavior of interest. These were: smoking (TPB/TRA, TTM); sexual behavior (PMT, TPB/TRA, SCT, II); alcohol abuse (PMT, TPB/TRA, SCT, TTM, HAPA); eating habits (HBM, SCT, II); exercise (HBM, PMT, TPB, II, HAPA, PAM); and medication adherence (HBM, II). Thus, to a certain extent, the best theory for developing an intervention, depended on the health behavior being targeted. The authors also concluded that, overall, interventions most likely to lead to changes in intention and behavior were based on PMT or TPB/TRA, while also using behavior change strategies (e.g., incentives) and one-to-one or group implementation.

Two articles were reviews of health-related behaviors and PMT: one of the articles (Milne et al., 2000) included a wide range of non-driving behaviors; and the other focused specifically on physical activity (Bui et al., 2013). The reviews included 20 and 27 studies which were analyzed to determine the strengths of the associations between the components of PMT, primarily threat and coping appraisals and self-efficacy, and behavioral intention or change. Both studies found a strong association for coping appraisal, with moderate associations with threat appraisal and self-efficacy. The studies concluded that PMT was useful for predicting current behavior, less effective for predicting future behavior, and was useful for developing interventions for increasing physical activity and possibly other health-related behaviors.

Two articles are commentaries on the continuing value of TPB, with one asking whether or not it is time to retire TPB (Sniehotta et al., 2014) and the other is a commentary in response to the first paper written by one of the developers of TPB (Ajzen, 2014). Sniehotta and colleagues argue that there are several published criticisms of the theory, particularly about the lack of evidence for good predictive validity. They also discuss that TPB, while once having great utility, has outlived its usefulness. It no longer accurately explains accumulated empirical evidence and is no longer a plausible theory of behavior. In his response to this commentary, Ajzen (2014) argues that Sniehotta and colleagues' statements are misguided and based on a poor understanding of TPB and do not take into account the complexity of the theory.

A paper by Ogden (2003) analyzed the results of 47 empirical studies that had a substantial focus on health-related cognitions and used at least one of four social cognition models: HBM, TRA, PMT, and TPB. The author concluded that these models were useful for guiding research but was critical of the models' conceptual bases for three reasons: the models do not enable the generation of hypotheses that can be tested due to unspecific constructs; the models focus on truths by definition (analytical) rather than truths known through exploration and test (synthetic); and the models may create and change behaviors rather than describe them.

The annotated bibliography includes an article that is a commentary on risk and rationality related to adolescents and decision making (Reyna & Farley, 2006). This article provides a wide-ranging discussion of adolescent cognitive development, decision making, risk taking, theories of risk taking, and interventions. The article states that models of risky decision-making fall into two categories: rational, decision-making frameworks that include perception of risk and benefits (e.g., HBM, TPB); and gist or prototype frameworks that include dual-pathway processing (e.g.,

FTT, PWM). Both frameworks have advantages in predicting adolescent risk-taking behaviors; that is, perceived risk and benefits have been shown to predict risk-taking behaviors while dual-process models can help explain that risk-taking behaviors can result from several causes other than perceptions of risk or benefits. The article also presents the following implications for adolescent risk-taking interventions: traditional interventions that focus on accurate perceptions of risk are likely to be ineffective because adolescents often overestimate risk and report vulnerability in risk-taking situations; experience can be a poor teacher for adolescent risk-taking because people this age tend to not learn from negative outcomes (however this changes rapidly with age); and interventions that discourage assessment of risk and benefits may be more effective for adolescents because adults make better decisions regarding risk taking because they understand the gist of the risky situations.

Campaign/Communication Strategies

Overview

The goal of traffic safety campaigns is to promote a desired behavior (e.g., driving without distraction, driving without alcohol impairment, or always using a seat belt). To achieve the desired outcome, campaign developers must make several decisions, all of which can impact the effectiveness of the campaign. This section summarizes information from the annotated bibliography (and some additional articles) related to communication strategies, with a focus on practical information. These decisions fall into five general categories: theory selection, audience factors, message source, message content, and message delivery (Elder et al., 2004). This section concludes with a discussion of HVE. Even though this project does not focus specifically on HVE, many traffic safety campaigns couple their messaging with HVE.

Theory selection

Once a problem behavior has been identified, the next question that needs to be asked is why road users display such behaviors. If the problem behavior is due to a lack of knowledge, then the campaign should educate about the behavior. If the problem behavior is volitional (intentional mistakes or violations or both), where the individual chooses to commit an unsafe act despite having the requisite knowledge, then it is necessary to identify what motivates the road user to adopt such behavior and counter that motivation. This is not the same as the message strategy that taps automatic or planned processes, just that the behavior itself can be controlled (Bargh, 2002). The best way to do this is to use an appropriate theoretical model. A theoretical model can be both explanatory and descriptive, capturing important elements and variables, and providing structure for describing interrelationships and predicting behavior. Once the theory has demonstrated prediction of the target behavior for prevention, it can be used to inform campaign design.

A meta-analysis undertaken in Europe of 228 studies conducted in 14 countries identified overall effectiveness of traffic safety campaigns (Vaa et al., 2009). Safety targets included a reduction in road incidents (9%), increased seat belt use (25%), reduced speeding (16%), increased yielding behavior (37%), and increased comprehension of risk (16%). A follow-up meta-analysis from 67 studies of 119 effects showed that effectiveness was most likely with campaigns to reduce impaired driving, those that lasted less than 1 month, included personal communication, were delivered proximal to the behavior (e.g., roadside), combined rational and emotional messaging, and were accompanied by enforcement (Phillips et al., 2011). Additional studies also highlighted

that campaign effectiveness could be tied to concurrent safety efforts such as enforcement (Zampetti et al., 2013), including DDB and impaired-driving campaigns. A review of campaigns to reduce impaired driving implemented through the 1980s and 1990s showed that the median decrease in alcohol-related crashes was 13%, and the economic analysis of the implementation of such campaigns also showed benefit. This review posited that the effectiveness of campaigns was likely due to their well-planned nature (e.g., those with evaluations attached), strong audience exposure, and frequent implementation in conjunction with enforcement efforts (Elder et al., 2004). In addition to theory that informs a campaign, other processes thus improve likely effectiveness.

The research reviewed for this report has several limitations that must be considered when applying the theories to the design and evaluation of campaigns. First, rarely are campaigns evaluated for effectiveness in reducing crashes or their efficacy in changing the motivational or theoretical constructs that are targeted in the campaign. A related issue is that it is often difficult to measure effectiveness. A suitable comparison group that does not receive the campaign is often challenging. Where campaigns are evaluated it often reflects only market penetration or awareness. Campaigns are evaluated, for example, to determine who in the community (ideally the target audience) heard of or recalled the safety message of the campaign. This is important information in that the audience needs to receive the message, but is not sufficient to show effectiveness in changing behavioral outcomes. Further, several media are often used to deliver messages in a campaign, and it can be difficult to gauge the impact that the delivery strategy has on appropriately communicating the theory-based information to the target audience.

Despite the limitations of the existing empirical evidence for behavior change theories, particularly for traffic-safety-related behaviors, several studies in the annotated bibliography provided recommendations or suggestions of models/theories of behavior change for a variety of behaviors. Two of these articles were related specifically to traffic safety improvement campaigns (Robertson & Pashley, 2015; Delhomme et al., 2009), while the others looked at non-driving health behaviors. The recommended and suggested theories are shown in Table 6 by article and theory. Six of these theories have not been described previously: associated-propositional evaluation model; SLT; SNT; TIB; TSR; and TM. Brief descriptions are given here.

According to Delhomme et al., the APE is a dual-attitudinal model that posits that attitude change is based on a person's evaluation of the behavior (attitude object) and that this evaluation is based on two kinds of attitudes—explicit (evaluations that are reported by the person and are deliberate and require cognitive effort) and implicit (based on associative processes that are automatic and affective reactions when a person is exposed to the attitude object). According to the model, different behaviors are guided by different types of attitudes and explicit attitudes are better predictors of volitional behaviors (e.g., putting on a seat belt). Explicit attitudes can be changed in three ways: changing the underlying implicit attitude; changing the information about the behavior that the person considers relevant; and changing the strategy used to achieve consistency in the information about the behavior.

Table 6. Recommended and suggested theories by article and theory

Theory	Article			
	A	B	C	D
Associated-Propositional Evaluation Model		x		
Elaboration-Likelihood Model	x	x		
Health Belief Model	x	x		x
Protection Motivation Theory	x	x		
Social Cognitive Theory			x	x
Social Learning Theory			x	
Social Norms Theory	x			
Theory of Interpersonal Behavior		x		
Theory of Planned Behavior	x	x		x
Theory of Reasoned Action				x
Theory of Self-Regulation		x		
Transtheoretical Model/Stages of Change	x	x	x	x

A=Robertson & Pashley, 2015

B=Delhomme et al., 2009

C=Luca & Suggs, 2013

D=Anker et al., 2016

SLT posits that people learn through the observation of other people's behavior, attitudes, and behavioral outcomes (Bandura, 1977). There are four conditions for social learning to take place: attention (notice and process the behavior of interest), retention (remember what attention was paid to), reproduction (ability for one to perform the behavior), and motivation (a reason to engage in the behavior).

According to Robertson and Pashley (2015), SNT posits that behavior is influenced by what a person believes other members of his or her social group think and how they behave. These beliefs are often not accurate. Behavior change can be affected by changes in these beliefs.

TIB is similar to TPB in that it posits that behavioral intentions and, ultimately, behavior are predicted by social factors, affect, and perceived consequences (Delhomme et al., 2009). TIB also includes the influence of habits on behavior. Habits are automatic or semi-automatic processes that require little conscious thought. The influence of habit over behavior increases as the level of consciousness decreases and intentions and habits are inversely related. As behaviors are engaged in (such as using a seat belt), they gradually become under the control of habit.

According to Delhomme et al. (2009), TSR posits that behavior change is based on a process whereby people compare their current situation with a goal or reference situation (what the person is trying to achieve). If there is a discrepancy, then they will act to minimize the discrepancy. Delhomme et al. (2009) provide the following advice:

The issue for researchers and practitioners designing a campaign is what to emphasize: goal attainment ... or goal disengagement? This requires a careful understanding of the aim and target audience of the campaign. To be sure, it might be the case that one wishes to slow down speeders or to stop drinking drivers, and the idea is to have them accept this goal and assist them in achieving it. (p. 67)

TM suggests that behavior change is based on a person going through six stages before the new behavior is firmly established (Prochaska & DiClemente, 1983). These stages are pre-contemplation (no intention to change behavior and may resist change); contemplation (aware of problem, but no action is being taken); preparation (preparation for behavior change has started); action (behavioral change has occurred but still at high risk for reverting back to old behavior); maintenance (behavior is starting to become a habit); and termination (the behavior is firmly established). TM posits that people can move forward and backward between the stages.

Audience factors

One of the most important components for developing an effective behavior change campaign is to have good knowledge about the intended audience and the specific behavior to be changed, ideally through some empirical data collection effort and review of published literature (Delhomme et al., 2009; Robertson & Pashley, 2015; Wilson, 2007). Not only is it important to know about the people who engage in the undesirable behavior but also the context and motivations under which it occurs (Robertson & Pashley, 2015). Several authors recommend segmenting the audience into relatively homogenous groups and targeting segments with specifically designed campaigns (e.g., Delhomme et al., 2009; Wilson, 2007). Hoekstra and Wegman (2011) point out that research shows that a variety of campaigns, including mass media campaigns, have been found to be more effective if they target a specific group. There are several issues to consider when segmenting an audience for a behavior change campaign including demographics and geographic variables, primary and secondary audiences, theoretical models, targeting language and culture, and personality.

Demographic and geographic: The most straightforward way to segment a population is to use easily obtained variables (Delhomme et al., 2009; Robertson & Pashley, 2015). The first of these is demographics, which can include variables such as age, gender, income, education, family composition, occupation, and many others. The second is geographic variables which divide the population into geographic regions such as countries, counties, cities, population densities, school districts, etc. Segmenting the population based on demographics and geography is often necessary given limited resources for campaigns, but efforts should be made to segment further based on campaign objectives.

Primary and secondary audiences: It is important to keep in mind when segmenting an audience that there may be both a primary (the person engaging in the unsafe behavior) and a secondary audience (people in a position to influence the behaviors of the primary audience) (Delhomme et al., 2009). Secondary audiences are particularly important for impaired-driving and DDB campaigns. For example, secondary audiences for impaired-driving campaigns can include alcohol servers; designated drivers; parents; and friends. Secondary audiences can be targeted directly by a campaign or can help to support the campaign message and reinforce intended behaviors.

Theoretical model: Some authors argue that when possible, segmentation should be based on the variables and constructs of the theoretical model underpinning the campaign (Delhomme et al., 2009; Friedman et al., 2016; Robertson & Pashley, 2015; Wilson, 2007). As described by Delhomme et al. (2009), the TM posits that there are six stages that people go through when changing a health-related behavior. Segmenting the audience based on which stage people are in would allow specific campaign components to address moving onto the next stage.

Targeting language and culture: A well-designed traffic safety campaign carefully considers the community or jurisdiction in which it is being implemented (Delhomme et al., 2009; Hinyard & Kreuter, 2007; Robertson & Pashley, 2015; Whittam et al., 2006). For example, in targeting impaired driving, it is important to understand whether the approach should be a global-level message and target the entire community (thus affecting community-wide attitudes and behavior) or whether it should be targeted at high-risk groups and/or the high-risk contexts that promote impaired driving. It might target driving over the 4th of July weekend or driving home from a bar at night, or it might target a narrow group, such as people who serve alcohol. It also helps to consider whether a campaign developed in one part of the country can transfer to other areas. Identifying the crash-risk context in any given community and thus the target audience allows for the development of an understanding of why that target audience engages in DDB or impaired driving or both. Recognizing the factors that motivate the target audience allows consideration of the message design (e.g., should it target an emotional response) and how to make the message compelling. The target audience may be segmented by factors such as language and culture. Well-executed campaigns consider the strategies most likely to efficiently reach the target audience through media that it engages (e.g., during the television programs they watch), and at the times and places that are most relevant (e.g., roadside billboards where they are likely to be seen by drivers or at high-risk locations).

Personality: Another way in which to understand the audience is to consider personality (Delhomme et al., 2009; Friedman et al., 2016). An understanding of personality may be used to consider the way that a message is framed or the way that behavior-change-theory constructs might operate to reduce DDB or impaired driving, however, personality is not expected to change. Personality, like demographic factors, could be considered a moderating factor. Fernandes et al. (2010) in a study of speeding behavior considered personality theories relating to authority and rebellion, which added value to the model used to predict speeding among young drivers. Kaye et al. (2013) used a personality theory (r-RST) to highlight the moderating role it could play in responses to and interpretation of speeding campaigns and the use of efficacy within those campaigns.

Some common personality constructs that have been described within traffic safety include sensation seeking, risk perception, and optimism bias. Sensation seeking is, “a need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences” (Zuckerman, 1979, p. 11). Sensation seeking reflects a desire to seek out novel and new situations, to find excitement or thrill in situations. Similarly, risk perception is often considered a personality trait, one which is not considered amenable to change, but reflects the lens through which people view and interpret campaigns (Deery, 1999). Optimism bias can reflect the degree to which one believes they will see more positive outcomes for themselves compared with others and can be considered a pervasive cognitive bias (Lapsley & Hill, 2010).

Message source

Regardless of the campaign, it is linked to a source. According to Delhomme et al. (2009), there are two message sources: organizations (those perceived as responsible or involved in the campaign) and spokespersons/testimonials (those who deliver/support the campaign message). Both sources can be categorized from the perspective of the target audience based on credibility. Sources that are credible have a better chance of resulting in an effective campaign (Petty et al., 1981). Credibility has been divided into three dimensions (Delhomme et al., 2009; Wilson,

2007): expertise (the extent to which the communicator is qualified to make the argument he or she is making); trustworthiness (the sincerity and level of honesty of the communicator); and attractiveness (the physical appearance, status, personality, and/or similarity of the communicator). Organizations that are perceived as credible and trustworthy (e.g., not just trying to make more money) to the audience, have a better chance for campaign effectiveness. Similarly, campaign effectiveness can be improved by using a spokesperson for whom the audience believes is trustworthy, credible, and attractive. As noted by Wilson (2007), for campaigns that use websites, the source of the message is sometimes unclear, and spokespersons are often not used.

Message content

A fundamental aspect of communication campaigns to change health behaviors is the structure and content of the campaign message. As discussed by several researchers, the content should be carefully considered with respect to the behavior to be changed, the target audience, and channels intended to be used to deliver the message (Elder et al., 2004; Delhomme et al., 2009; Robertson & Pashley, 2015; Whittam et al., 2006; Wilson, 2007). A detailed discussion of all facets of developing effective messages is beyond the scope of this report, however, here we review several important issues that should be considered when developing message content. These issues include level of messaging, fear-based appeals, use of humor, framing, drawing firm conclusions, one-sided versus two-sided messages, and use of statistics versus examples.

Level of messaging: According to Nation et al. (2003), the relevance of a program to the audience is a primary factor in producing positive outcomes by reducing harm. Lerner (1995) indicated that a key aspect of intervention design is that the target population's perception of their social ecology is understood. To engage interest, strategies must be meaningful, perceived to be relevant, and developmentally appropriate (Coatsworth et al., 1997; McCord & Tremblay, 1992). Using injunctive norms is particularly relevant when considering whether to use a global or targeted message. Highlighting people important to the target audience may vary depending on the audience. Similarly, when considering descriptive norms, the prevalence of a particular behavior may vary considerably among different groups of people. Hence, the identity of groups to which the normative messages are presented may require the campaign message to be segmented or tailored for different groups. Hecht (1993) highlights that identity can be conceptualized as part of the communication process. Rather than being a byproduct of communication, it is suggested that there are mutual influences between communication and identity. Social relations are posited to be internalized as identities through communication within this theory.

Fear-based appeals: Fear and threat-based appeals are common in traffic safety campaigns (see e.g., Delaney et al., 2004; Yadav & Kobayashi, 2015). These appeals attempt to take advantage of emotional responses in the target audience (through graphic imagery, shocking statements, etc.) to motivate behavior change (Robertson & Pashley, 2015). The effectiveness of fear-based appeals in changing behaviors has been the subject of a large body of research (summarized in Elder et al., 2004; Delhomme et al., 2009; Hoekstra & Wegman, 2011; Robertson & Pashley, 2015; and Wilson, 2007). Wilson (2007) provided the following generalizations from this research. Messages with more intense or graphic content arouse more audience fear. However, the effectiveness of fear appeals has not been clearly established in the literature. Some work shows that fear appeals can be persuasive and effective but there seems to be a curvilinear relationship—moderately fearful messages are more effective than extremely fearful messages.

Other work shows the opposite, provided the audience believes that they are personally vulnerable to the threat and that there is a viable response that they can engage in to eliminate the threat. As such, Wilson argues that convincing people that they are vulnerable to the threat is particularly important for message persuasion. This may be, in part, why coupling traffic safety enforcement messages with visible enforcement has been shown to be a particularly effective strategy for changing some traffic safety behaviors (e.g., Hinch et al., 2014).

Use of humor: Humorous messages are common in marketing campaigns and have also been used in traffic safety campaigns. Little research has addressed the effectiveness of humor in traffic safety campaigns (Delhomme et al., 2009; Guttman, 2015). Drawing on research from the fields of marketing and advertising, Delhomme et al. (2009) provided several ways in which humor can influence the effectiveness of messaging: humor can create positive affect, greater trust, and increased affinity toward the campaign and messages; and humor can block processing of the message content by distracting people from thinking about counterarguments. These researchers also concluded that humor may have a stronger effect when the audience already has a positive attitude toward the message. These findings suggest that humor may be best applied in campaigns designed to maintain positive behaviors and when coupled with other non-humorous messaging. In the latter case, the humor can draw attention to the campaign while the other messaging can target behavior change. Nevertheless, more research is needed to understand the effects of humor on the effectiveness of traffic safety campaigns.

Framing: A key component to Wundersitz et al.'s (2010) conceptualization of message strategies suggested that the way in which the target audience evaluates a suggested behavior as either a gain or loss can affect persuasion. Kahneman and Tversky (1979) in their conceptualization of PT provided a strong foundation for a person's consideration of gains and losses in behavior change. A gain-framed message highlights the positives or potential gains from behavior. For example, a message could present gains such as friends' approval of intervening with others' risk behavior and greater safety from intervening to stop impaired driving. In contrast, a loss-framed message highlights the negatives or potential losses from failing to adopt the safe behavior (or continuing to engage in the risk behavior). For example, getting a ticket or in a crash because of impaired driving.

The consideration of gain-and-loss-framed messages has been undertaken in examination of the effects of efficacy to perform a health behavior. For example, Block and Punam (1995) found that low-response efficacy conditions (i.e., when it is not clear whether a recommended behavior will lead to desired outcomes) motivated more in-depth processing of a message. Combining low-response efficacy with a loss-framed message was associated with greater persuasion (willingness to undertake a safe behavior). In contrast, a high-response efficacy condition generated less in-depth processing regardless of gain or loss framing. In an alternate consideration, Novemsky and Kahneman (2005) argue emotional attachment and cognitive focus moderate the effectiveness of gain and loss framing. McGraw et al. (2010) suggest that a loss frame has more influence than a gain frame by virtue of expected pain from losing outweighing the pleasure of a gain, at least when gains and losses are considered together, but that this is not necessarily the case when both gains and losses are presented separately. This highlights the need for further consideration than communicating simply loss or gains or both.

Message framing has been considered in areas of traffic safety. In a test of the EPPM, Lewis et al. (2008) argued that the construct of response efficacy held more relevance compared with self-efficacy, depending upon the message framing. This suggests that a belief that a coping strategy

can avert threat has greater efficacy than a belief in oneself in averting threat. Lewis et al. (2008) presented participants with two video-delivered advertisements, one that presented a message designed to increase fear and a second targeting humor. The humor-based advertisements were associated with stronger intention to avoid impaired driving at their longer follow-up (2 to 4 weeks) compared with immediate posttest where fear-based messaging had better outcomes. The interaction of response efficacy (understanding of coping strategies presented) was associated with the fear-based message having better outcomes than without response efficacy. The findings also highlight research considerations and the timeframe needed to evaluate campaigns beyond that which is typically used, immediately after viewing the message. In practice, Lewis et al. (2010) argue that the construction of campaigns and exposure of a single message can much more easily include coping strategies rather than self-efficacy targets. For example, they can provide a coping response, such as a suggestion that one could prevent the temptation to send a text and getting a ticket by turning the phone off prior to getting in the car.

Automaticity and priming: It can be important to consider whether messages should reflect a clear, conscious, decision-making process or a nonconscious influence, both of which can be successful in influencing judgement, motivation, and behavior (Bargh, 1992). Such message strategies can be considered in conjunction with other theories. For example, Bargh (2002) highlights the relevance of targeting automaticity in conjunction with goal pursuits. Bargh et al. (1996) suggest that attitudes and affective reactions can be triggered automatically and that a self-representation or self-concept can be automatically activated depending on the stimuli presented. The assumption here is that automatic influences, particularly in social perception, can be primed. Their work suggests that priming can be elicited when it fits with a person's existing traits and aligns with the person's current situation and goals, and they conclude that behavior can be triggered automatically by contextual or environmental features. Control over automaticity is suggested with (i) awareness of the possible influence, (ii) motivation to take control, and (iii) attention directed at the relevant stimuli (i.e., lack of distraction) (see, Bargh, 1989). Related, it has been suggested that priming through social stereotypes can be used to promote behavior change through capitalizing on and reinforcing preexisting notions and stereotypes of groups (Pechmann, 2001). The approach does, however, rely on an existing belief from which to build or strengthen.

Hoekstra and Wegman (2011) discuss automaticity and priming in relation to road safety campaigns, pointing out that automaticity plays a significant role in car driving and, likely, traffic safety behaviors. They suggest that the principals of automaticity and priming could be applied to traffic safety campaigns with the special advantage that people would not need to actively process the campaign message or imagery or both. The authors argue:

The research amassed on automatic behaviors and priming suggests that, when presented with certain images and words, people may automatically exhibit the behaviour that those stimuli invoke. This means that it is a matter of finding which images, words or otherwise invoke the behaviours one would like to see. (Hoekstra & Wegman, 2011, p. 84)

The authors suggest that road safety campaigns can inadvertently invoke the wrong message if the words or imagery prime an unwanted behavior. For example, an anti-drowsy driving campaign showing a driver being sleepy while driving might prime the concept of sleepiness. The authors caution that campaign messages and imagery should be pretested to determine if there are any unintentional side effects.

Drawing firm conclusions: Wilson (2007) in her commentary on designing media messages for health and nutrition, discussed whether messages should explicitly draw firm conclusions as opposed to leading the audience to a conclusion that they draw on their own. The article states that there is clear evidence from research that messages with clear conclusions or recommendations or both are the most effective. This finding holds over a variety of conditions, behaviors, and audiences. Wilson speculated that one explanation for her finding is that by not providing a conclusion audience members may reach an inaccurate or extreme conclusion.

One-sided vs two-sided messages: Another factor to consider when developing message content is to decide whether or not to address opposing viewpoints (Delhomme et al., 2009; Wilson, 2007). For example, in terms of DDB, a one-sided message might only address the safety consequences of cell phone use, while a two-sided message might address this issue but also address the desire to multitask by talking with friends or conducting business on the phone while driving. Based on reviews of the literature (Delhomme et al., 2009; Wundersitz et al., 2010) there are several factors to consider in deciding on the use of one-sided versus two-sided messages. One-sided messages are more effective when: the audience is sympathetic to the message; when a short-term or immediate change in behavior is intended; and when it is the only message they will pay attention to. Two-sided messages are more effective when: the audience holds opposing viewpoints or simply disagrees with the message; and the audience is likely to be exposed to the opposing viewpoints anyway (such as might be the case in motorcycle helmet use campaigns).

Use of statistics vs examples: A common theme for traffic safety campaigns is the use of crash and injury statistics. It is also common to focus on a single illustrative case or example to make a message's point. According to Wilson (2007), the research on this topic has to date provided mixed results. Thus, more research is needed and no recommendations on this topic can be provided.

Message delivery

There is a wide and expanding array of media choices available and the theory chosen needs to fit with the choice of media. Deciding what media and delivery options to select should be based on a combination of factors, including the target audience, the characteristics of the media (e.g., reach and selectiveness), duration, resources available, and the message to be communicated. Delhomme et al. (2009) compiled a summary of advantages and disadvantages of various media options. The authors also highlighted that media options vary in the user's ability to control the message and exposure, thus having implications for the delivery of a theoretically derived message to all recipients. For example, the use of viral marketing or internet discussion forums is noted to be disadvantageous because the audience controls exposure and because there is a need to simplify the message so that it can be delivered with little alteration or degradation. Despite advantages of easier transfer of information, using existing, perhaps more important, networks and taking advantage of others' resources is important to factor in. In contrast, a billboard poster can maintain a consistent theoretically derived message. There are notable drawbacks to this approach in the limited attention and information capacity of the target audience.

Few of the theories reviewed considered timing of the message. An interrelated concept is message exposure. There is no clear optimal exposure in health campaigns. Woolley (2001) suggested that research on health campaigns' effects of exposure is inconclusive, but suggests greater efficacy for proximal exposure and repeated exposures following a law of diminishing returns. However, such considerations can be simplistic and fail to consider the changing state of

the audience over time and the potential value of burst campaigns that may be presented at teachable moments. These could include impaired-driving campaigns delivered at periods of known risk, such as on St Patrick's Day. Robertson and Pashley (2015) consider positive effects of campaigns delivered over short periods (e.g., less than 1 month), noting that it is possible to extend the campaign, but necessary to refresh them intermittently with new content to keep them top of mind. It may be that timing is highly interlinked with the message content. For example, a campaign may be implemented around Father's Day and target self-representations of being a responsible father and modelling safe behavior around cell phone use and driving.

Consideration of high visibility enforcement

The research examining the effectiveness of intervention programs that combine high visibility enforcement with public health campaigns that are based on behavior change theory is extremely limited. In many cases where it seems that such an approach has been taken, the theory providing the basis for the public health campaign is seldom named, and implementation of theory typically is limited to the inclusion of one theoretical construct. Indeed, given the complexity of most health behavior change theories, which include several constructs and their interrelations, it doesn't seem realistic to expect a campaign to operationalize the theory in its complete form. Nevertheless, campaigns that do effectively operationalize some of the constructs of a theory are more likely to succeed than those that do not involve such constructs or that employ them poorly or incorrectly. The three studies briefly reviewed below provide common examples of attempts to include constructs from behavior change theories in mass media campaigns that are coupled with HVE.

Evaluations were undertaken of mass media combined with the implementation of sobriety checkpoints called the *Checkpoint Strikeforce* campaign (Beck, 2007; Lacey et al., 2008). The campaign slogan was, *You Drink and Drive. You Lose*. Crash data were analyzed from the period before the intervention, 1999 to 2001, to after the intervention period, 2002 to 2004. Awareness was also measured with phone surveys, $n \sim 1,700$ /year over the study period. Findings showed a net change in crashes over a 3-year average. They found that before and during the campaign, alcohol-related total crashes increased 2.2%, alcohol-related injury crashes decreased 4.7%, alcohol-related fatality crashes decreased 2.7%, total alcohol-related fatalities increased 14.7%, and alcohol-related injured drivers decreased 3.8%. From the telephone survey, they found that feeling likely to be stopped decreased over time (~65% each year reported to be unaware and unexposed to the campaign, and feeling likely to be stopped decreased each year from 30% down to 23%). Alcohol-related fatal crashes in intervention sites decreased 7.1% (although this was non-significant). A strength of the research design was the use of crash data to measure change over time in impaired driving. A further strength was the use of phone surveys to understand potential mechanisms for change (focused on consequences of enforcement).

Newstead et al. (1995) examined the overall change in police-reported serious injury crashes before and after the implementation of the *Bloody Idiot* campaign that was complemented by increased random breath testing for impaired driving. Random breath testing in Australia, where the evaluation took place, involved police randomly identifying roadways and pulling over as many drivers as feasible on that roadway in a given time period. The research did not identify any behavior change theory that might underpin the *Bloody Idiot* campaign, however it suggested that there are negative consequences to impaired driving and that the reputation of those who do drive impaired is not favorable. Additional traffic safety initiatives were undertaken concurrently including the use of cameras to capture vehicles speeding, efforts to reduce alcohol sales, and

efforts to improve accident black spots. Further, the evaluation occurred at a time of reduced economic activity (recession). The evaluation design was weakened by the lack of a comparison community in the evaluation, however, the authors reported that the contribution of impaired driving to nighttime serious injury crashes decreased approximately 14% between 1990 and 1992.

The *Click it or Ticket* campaign (Solomon et al., 2009), which focused on HVE of seat belt use was evaluated. Evaluations focused on 18-to-34-year-old males (N=~400/ campaign). Pre and post surveys around campaigns were undertaken in intervention counties and control counties. There was increased awareness and perception of enforcement in the intervention counties, however, no difference in perceived risk of being ticketed was found. There was an observed increase in seat belt use. The study benefitted from a strong evaluation design that included comparison counties, the use of data from a census of all fatal crashes occurring (Fatality Analysis Reporting System), and survey data to assess the processes (awareness, perception of message) leading to behavior change.

Although not included explicitly in these studies, it is likely that the mass media campaigns attempted to raise the awareness of the dangers of impaired driving and provide motivation to change behavior to avoid punishment. Raising awareness is important, but not sufficient to create change unless it also increases individual motivation to alter behavior. Motivation can be provided by highlighting social norms, increasing perceived risk of injury to self or others, providing information that enhances self-efficacy to change, or increasing appreciation for the advantages or gains made by altering one's behavior. These are common elements of behavior change theories, but are likely to be less effective if applied singly. Combining more elements of theory in a campaign increases the likelihood that motivation will increase. Norms have been successfully targeted using social marketing strategies to educate people of the true behavioral norms.

HVE is based on deterrence theory (Beyleveld, 1979a, 1979b), which focuses on three characteristics of consequences of infractions and on the perception of risk. The three characteristics of consequences are: certainty (i.e., the consequences cannot be avoided and are inevitable); celerity (i.e., the consequences will happen quickly following the violation); and severity (i.e., the consequences will be sufficiently undesirable that the infraction in question will be avoided in the future). In addition, there must be a perception that the risk of detection and consequences is great; however, it is the perception of the risk and not the probability of detection that is posited to be the effective deterrent (Vingilis & Salutin, 1980; Voas, 1982; Jonah & Wilson, 1983; Williams & Lund, 1984). Hence, HVE is a strong deterrent of illegal behaviors such as impaired driving, but its effectiveness is enhanced when coupled with appropriate theory-based campaigns.

Summary and Conclusions

Overall themes and synthesis

In this section, we summarize findings within each section and then discuss general conclusions.

Theory fit

Thirteen behavior change theories were highlighted in "Theory Fits" section within the context of DDB, impaired driving, other driving behaviors, and/or health behaviors. TPB was by far the

most frequently examined theory – it was mentioned 28 times – 11 regarding DDB, 9 impaired driving, 6 other driving behaviors, and 2 health behaviors. The only other theories examined regarding DDB were AT and HBM. Five theories, in addition to TPB, were examined regarding impaired driving (AT, HBM, PWM, RST, and TRA). Five theories, in addition to TPB, were examined regarding other driving behaviors (HBM, HAPA, PWM, RST, and SCT). Nine theories, in addition to TPB, were examined regarding health behaviors (AT, EPPM, HAPA, IMB, PT, PMT, RFT, SDT, and SCT). Collectively, evidence was found for the utility of each theory in helping predict or least understand the behavior or behavioral intent of interest, although effect sizes were often affected by sociodemographic and other characteristics of study participants such as age, sex, and trip purpose. There was considerable variation across studies in terms of whether the theory of interest was used in its full form with all its underlying constructs included, whether some constructs were omitted, or conversely whether additional constructs were included. There was also variation in measures and tests used, whether outcomes focused on intentions or actual behavior, the size and characteristics of the study samples, how generalizable the results were, and the actual effect sizes. Nevertheless, in terms of theory fit, results from this section suggest that no single theory should be held up as the only useful theory for campaign development for DDB and impaired driving. Rather, the selection of theories and their underlying constructs should result from informed consideration of the behaviors being addressed and the audiences being targeted.

Evaluation or campaign studies

The literature review generated several articles in which behavior change theories were used in the design, implementation, and evaluation of impaired-driving and DDB campaigns. Many of the articles described in the “Evaluation of campaign studies” section provide evidence for the importance of considering behavior change theory as a guide to campaign design, primarily regarding the development of campaign material. For example, TPB was used as the guiding framework for the development of material in a successful campaign to reduce speeding behavior (Stead et al., 2002; Stead et al., 2005). Campaigns that are guided by theory also can be evaluated in terms of the constructs used within the campaign, thereby generating results that can help provide reasoning for the outcomes of the campaign as well as information regarding changes that could be made to ensure more effective communication of the campaign’s intended message. There is also evidence to support the idea that theories that are used in their entirety, as opposed to using only select constructs from a single theory, are more effective at producing behavior change (e.g., LaVoie & Quick, 2013; Nathanail & Adamos, 2013).

This section also emphasized the fact that controlled scientific studies evaluating theory used in persuasive messaging as well as the evaluation of the material itself can also contribute to the development of more successful campaign material. Two studies demonstrated the efficacy of both EIM and ELM in explaining how emotional appeals affect attitudes and behavioral intentions toward impaired driving. Another study used RFT as the basis for studying one-sided and two-sided messaging on peoples’ intention to reducing driving speed. Collectively, the information gleaned from experimental studies about campaign messaging can be used to appropriately tailor material for future traffic safety campaigns.

Other evidence of theory

Several articles from the literature review were commentaries, reviews, meta-analyses, and other types of papers that were not direct, empirical evaluations of theories or campaigns. None of the

articles addressed DDB directly, three addressed impaired driving in some way, a few included unsafe driving behaviors (speeding, risky driving, adolescent seat belt use), and the remainder addressed either specific non-driving health behaviors or a set of health behaviors. With respect to impaired driving, the results showed that 3 theories were useful for addressing various components of impaired driving. One was TBI, which could have particular relevance for designing campaigns that are targeted at getting friends or family or both to intervene with impaired drivers. An example of a campaign with such a target-audience is the Friends Don't Let Friends Drive Drunk campaign. The other 2 theories were PMT and PWM which can both be useful for developing impaired-driving campaigns that directly target the potential drunk driver. The articles that addressed driving behaviors other than impaired driving and DDB showed that 3 theories could have utility in predicting traffic-safety related behavioral intent and behaviors. These included RAA, HAPA, and PWM. An additional decision-making theory, FTT, was also found to be useful in explaining both risk-avoidance and risk-taking behaviors, but it is difficult to see how this theory might be useful for guiding the development of traffic safety campaigns. The remaining articles addressed non-driving -related health behaviors. In part due to the wide range of health behaviors considered in these studies, several theories were found to be useful for either explaining or predicting behavior change. A clear conclusion from these articles is that no single theory is useful for every health behavior and that certain theories are better for certain behaviors. Thus, when designing a behavior change campaign, the selection of a theory to guide campaign development should be based on the behavior one is interested in changing.

Campaign/communication strategies

Several of the articles in the literature review provided useful advice and strategies for developing traffic safety campaigns, such as impaired-driving and DDB campaigns. This advice was provided in five general areas: theory selection; audience factors; message source; message content; and message delivery. There were several general themes that can be derived from these articles. First, it is important to understand the behavior of interest. For example, does the problem behavior arise from a lack of knowledge or from a deliberate decision to engage in the behavior? The more one knows about the problem behavior the better they can be in developing a campaign that targets that behavior. Second, it is important to know the audience and to segment the audience based on this information. A certain behavior, such as impaired driving, may have different underlying causes based on, for example, the age of the people who are engaging in the behavior. Certain theories of behavior are more effective at explaining the behaviors of one demographic as compared to others. Having accurate and detailed information about the target-audience and using this information in designing all aspects of the campaign, will increase the likelihood of campaign effectiveness. Third, careful thought should be given to the message source, content, and delivery. Several recommendations for this are provided in the "Campaign/communication strategies" section of the letter report. Finally, it is noted that many traffic safety campaigns pair a media-message component with a HVE component. Evidence shows that this is a particularly effective strategy for changing certain traffic-safety-related behaviors. We conclude that the effectiveness of this strategy could be enhanced by coupling HVE with an appropriate theory-based campaign.

General conclusions

While some theories only came up in a single section of the annotated bibliography, Table 7 shows that several theories were common in two or more sections. Specifically, TPB was

addressed in all four sections highlighted in the Findings section of this letter report. Theories addressed in three of the four sections included HBM, PMT, SCT, and TRA. Theories addressed in two of the four sections included AT, ELM, EPPM, HAPA, PWM, and RFT. These findings further underscore the summary results of each section that point to the potential utility of several theories in understanding and guiding behavior change regarding both driving and health behaviors. In fact, many of the theories identified in the literature review build on one another or explore similar dimensions of human behavior, so it is not surprising that more than a single theory has been shown to predict behavior or behavioral intentions in the areas of interest for this project and could potentially be useful going forward.

Table 7. Theories addressed in Findings section by subsection

Theory	Subsection				TOTAL*
	Theory Fit	Evaluation of campaign studies	Other evidence of theory	Campaign/communication strategies	
Automaticity Theory	x			x	2
Associated-Propositional Evaluation Model				x	1
Elaboration Likelihood Model		x		x	2
Emotion Information Management		x			1
Extended Parallel Process Model	x	x			2
Fuzzy-Trace Theory			x		1
Health Action Process Approach	x		x		2
Health Belief Model	x		x	x	3
Implementation Intentions			x		1
Information-Motivation-Behavioral Skills Model	x				1
Precaution Adoption Process Model			x		1
PRECEDE-PROCEED Model		x			1
Prospect Theory	x				1
Protection Motivation Theory	x		x	x	3
Prototype Willingness Model	x		x		2
Regulatory Fit Theory	x	x			2
Reinforcement Sensitivity Theory/Revised Reinforcement Sensitivity Theory	x				1
Self-Determination Theory	x				1
Social Cognitive Theory	x		x	x	3
Social Judgment Theory		x			1

Social Learning Theory				x	1
Social Norms Theory				x	1
Theory of Bystander Intervention			x		1
Theory of Interpersonal Behavior				x	1
Theory of Planned Behavior	x	x	x	x	4
Theory of Reasoned Action	x		x	x	3
Theory of Self-Regulation				x	1
Transtheoretical Model/Stages of Change				x	1

*Total refers to the number of subsections in which the theory was addressed (not number of articles or studies).

Limitations and Gaps in Literature

There were some limitations and gaps in the literature that are worth noting. First, while we found several studies in the literature that used theories as the basis for campaigns targeting DDB or impaired driving, the studies were often limited to samples of young people (under age 25) and relied on self-reported behavior or intended behavior as the outcome measure. This highlights the importance of understanding the role and limits on theories used in specific contexts or particular populations, and the need for campaign design to take into consideration characteristics of the target population and how those features might relate to the effectiveness of a campaign, as well as to the adequacy of the theory being employed. While teens and young adults are at high risk of crashing due to both DDB or impaired driving compared with drivers of other ages, they may experience different motivations, beliefs, influences from significant others, emotional reactivity, and other characteristics that are not identified in the theory and are specific to the age of the sample studied. In addition, examining intended rather than actual behavior may partially provide support for the theory and indicate the need for further research, but makes it difficult to reach conclusions about actual behavior. To address this intention-behavior gap, some theories involve a planning stage (e.g., HAPA model, Schwarzer, 2008).

The review found TPB was used to examine DDB and impaired driving more often than any other theory. However, it was not typically applied as originally devised by Ajzen (1991), with some studies applying only some of the components of the theory, and others adding constructs that were not originally intended to be part of the theory, such as moral norms. Additions to the theory also included personality constructs, such as sensation seeking (Zuckerman, 1979) or constructs from RST (Corr, 2004). Personality traits that theoretically cannot be or are very difficult to alter are typically included in theories as effect moderators and as factors that may be used to target the intervention messages for people with particular traits; however, mass media campaigns generally cannot be targeted with such fine precision.

Another limitation of many studies using TPB was that the interactions or relationships between individual constructs were generally not considered. In fact, while Ajzen noted the beliefs would be correlated, they are theoretically considered as independent predictors of behavior (through intention). Most common analysis is undertaken with regression modeling and each belief is used separately to predict behavioral intentions and the outcome behavior. Thus, although the originally theorized model posits correlations among the beliefs, that correlation is rarely included in research that employs the theory to explain behavior. This is generally true of all research based on TPB. While the research typically supports various constructs as individually

predictive of the intended behavior, it is not clear the degree to which including an interaction of constructs may add to the prediction of behavior. In one example that suggested the interaction term may be important was work undertaken by Åberg (1993) who examined the predecessor model to TPB, TRA. TRA is identical to TPB, except for the inclusion of PBC which was added to create TPB. In this study, they tested the interaction between ATB and SN as it related to intended impaired driving. Åberg found that there was a strong relationship between SN and ATB and that SN were related to the evaluation of sanctions. The author suggested that since many drivers did not have direct experience with impaired driving, expectations about outcomes were potentially socially derived.

It was not uncommon to find research studies that were limited to only assessing the prediction of beliefs on impaired driving or DDB intentions rather than examining the actual behaviors themselves. From meta-analyses and systematic reviews of TPB, it is clear that intended behavior does not always lead to actual behavior, in general the average explanation of behavior from intended behavior is as high as 24% of the variance (physical activity) and as low as 14% (safe sex). Of note, studies reviewing traffic behavior suggest around 40% of the variance in intended behavior is explained by the prediction of each of the three beliefs in the model (ATB, SN, PBC) (Godin & Kok, 1996). The work highlights the reason behind many researchers' decision to add further constructs to the model, or to eliminate intentions from their assessments. It is also evident that the variance explained in intention differs depending on the population studied, Moan found that the TPB model explained 40% of intention to ride with an impaired driving for younger passengers and 20% for older passengers (35 years and above). In earlier research on DDB, Walsh et al. (2008) only measured intended behavior but found that different belief constructs predicted different phone use and driving behaviors.

A final weakness of many of the studies using and assessing TPB was that even when a self-reported behavior was measured, such measurement was undertaken at the same time as the measurement of the belief constructs. This limits an understanding of how the beliefs really predict behavior, or alternatively, simply reflect associations that only exist at a single point in time. Further, there was no understood specified period in which beliefs may remain predictive of behavior. Wang (2016) undertook concurrent analyses. Gauld et al. (2014ab) employed a longitudinal design and followed up with participants only one week later to assess concealed texting behavior. Castanier et al. (2013) followed participants over a longer period and found the beliefs were predictive after 6 months. In this study a composite measure of risky behavior was used that included impaired driving and DDB.

Many of the same limitations associated with TPB also characterized studies using other theories. Of particular note were the use of highly selective samples making it difficult to generalize to the larger population; studies that relied on cross-sectional rather than longitudinal designs so that behavior could not actually be predicted; failure to use standardized measures of theory constructs; and effect sizes that were significant but modest. In addition, several studies combined two or more theories and it was difficult to disentangle results for each theory. In addition, many of the meta-analyses reviewed in the literature only provided a general description of the classes of behaviors addressed in the various studies (e.g., consumer or health behavior) rather than identifying specific behaviors which makes it hard to reach conclusions about how applicable the studies are to DDB, impaired driving, and other driving behaviors.

Recommendations for Moving Forward

In thinking about which theories we should retain and which we should drop as we move forward to the next stage of the project, we identified two criteria to guide decision making. Specifically, we used the following criteria to select theories to retain or drop from further consideration.

- The strength of the evidence that the theory is predictive of behavior generally (including both driving and health behaviors). That is, if only weak support was found across all articles related to the theory, it was judged as having weak evidence.
- The strength of the evidence that the theory is predictive of DDB and impaired driving specifically.
- We considered an additional criterion – the feasibility of incorporating the theory into the development of mass campaigns – but decided to note this as a potential limitation rather than apply it as a reason for excluding any theory.
- Based on the application of the two criteria to the set of theories identified in the literature review, we recommend retaining all the theories with the exception of one, as noted in Table 8.

Table 8. Recommendations for retaining or dropping theories from further consideration

Theory	Retain	Comments
Automaticity Theory	Y	Meets criteria
Associated-Propositional Evaluation Model	Y	Meets criteria
Elaboration Likelihood Model	Y	Meets criteria
Emotion Information Management	Y	Potentially not feasible
Extended Parallel Process Model	Y	Meets criteria
Fuzzy Trace Theory	Y	Potentially not feasible
Health Action Process Approach	Y	Meets criteria
Health Belief Model	Y	Meets criteria
Implementation Intentions	Y	Meets criteria
Information-Motivation-Behavioral Skills Model	N	Weak evidence, no studies on DDB/impaired driving
Precaution Adoption Process Model	Y	Meets criteria
PRECEDE-PROCEED Model	Y	Meets criteria
Prospect Theory	Y	Meets criteria
Protection Motivation Theory	Y	Meets criteria
Prototype Willingness Model	Y	Meets criteria
Regulatory Fit Theory	Y	Meets criteria
Reinforcement Sensitivity Theory/Revised Reinforcement Sensitivity Theory	Y	Potentially not feasible
Self-Determination Theory	Y	Meets criteria
Social Cognitive Theory	Y	Meets criteria
Social Judgment Theory	Y	Meets criteria

Theory	Retain	Comments
Social Learning Theory	Y	Meets criteria
Social Norms Theory	Y	Meets criteria
Theory of Bystander Intervention	Y	Meets criteria
Theory of Interpersonal Behavior	Y	Meets criteria
Theory of Planned Behavior	Y	Meets criteria
Theory of Reasoned Action	Y	Meets criteria
Theory of Self-Regulation	Y	Meets criteria
Transtheoretical Model/Stages of Change	Y	Meets criteria

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Appendix A-1: Description of Campaigns

The scope of this project only allowed University of Michigan Transportation Research Institute to obtain information about the campaigns from the campaign websites (other than the small sample of interviews conducted with SHSOs). Therefore, this project's knowledge base about the campaigns' objectives, target audiences, strategies, messages, material, etc., was limited to the information that appeared on the campaign websites at the time this study was conducted. Many of these websites are no longer active or now contain different information. Therefore, links to these websites are not provided.

Distracted Driving Campaigns

Arrive Alive: Distracted

Missouri Department of Transportation

According to the website, this was a distracted driving awareness campaign that ran from August 1 to November 26, 2015. The Missouri Department of Transportation partnered with a local television station and auto dealership. The campaign aimed to get audiences to pledge to drive distraction free and incentivized pledging with entries into a drawing for a new vehicle. The website included statistics (percentage of distraction-involved crashes, fine amounts for texting citations, amount of time eyes are off road for a typical text, percentage of teen drivers that text while driving), videos featuring testimonials from law enforcement and real people affected by distracted driving, three 30-second television ads (*Park The Phone*, *SEC Roadway Safety*, and *My Last Text*), a PowerPoint presentation about distracted driving, a definition of distracted driving, and links to other websites with distracted driving resources.

End Text Wrecks. Dance The Wookiee

Utah Department of Transportation

This was a Star Wars themed campaign that used videos and images of characters from the movies to encourage people to take a pledge to not drive distracted. The website (no longer active) contained videos, statistics about distracted driving, a link to the pledge, and links to campaign events and locations. The campaign also used social media via Facebook.

Focus On Driving Not The Distractor

Wisconsin Department of Transportation

The website included material from several campaigns targeting distracted driving. For this study, the expert panel limited its review to material containing the *Focus On Driving, Not the Distractor!* logo and tagline. The material included videos and audio clips (*The Distractor: Eating*, *The Distractor: GPS*, and *The Distractor: Makeup*). The material was humorous depictions of drivers being tempted by distractors, experiencing a near crash (in some cases), and eliminating the distractor.

It Can Wait

AT&T

The campaign urged the audience to (1) take a pledge to drive distraction free, and (2) be an advocate by leading by example and sharing the message with friends, family, and others. The website included an online pledge form, videos, a virtual reality experience (in desktop and

smartphone app formats) to witness the dangers of distracted driving, a social networking hub with posts from people who have pledged and messages from the campaign, an advocate toolkit, a sample school presentation, and a sample corporate presentation.

Just Drive (Put ur phone 2 bed)

New Jersey Motor Vehicle Commission

The campaign's message was *Don't text. Don't call. Just drive.* The campaign encouraged the audience to take the *Just Drive* pledge to not text or talk while driving. The website included statistics (amount of time texting takes eyes off the road, New Jersey laws and fines for using a cell phone while driving), a definition of distracted driving, two 30-second television ads (humorous depiction of people walking distracted ending with a near-crash by distracted driver, graphic recreation of distraction-involved crash and the emergency response), an extended video of the graphic crash recreation, five 30- to 60-second videos featuring the chairman of the New Jersey Motor Vehicle Commission reporting on campaign events (booths at community events, prize wheels for taking the pledge and sharing last text, a mobile distracted driving simulator), tips for avoiding distracted driving, and testimonials from real people about distracted driving (with a feature allowing viewers to share their own stories and a prize promotion for sharing a story).

One Call Can Change Everything

National Safety Council

This campaign was presented on a website that included general information about distracted driving and information about several distracted driving campaigns/research studies. For this study, the expert panel limited its review to material containing the *One Call Can Change Everything* tagline. Campaign material included video testimonials from people that lost family members and were injured in distraction-related crashes, information/facts (myth versus reality, underreporting of distracted driving in crash reports, etc.).

One Text or Call Could Wreck It All

U.S. Department of Transportation

This campaign was intended to educate about the dangers of distracted driving (with an emphasis on cell phone use) and to encourage people to act to prevent distraction. The campaign material available on the website included statistics on the prevalence of talking on a cell phone and texting while driving, video (BAM showing different examples of people texting and crashing), posters, flyers, animated banner ads for school websites (e.g., Caution! Don't use your phone when you drive. Click to learn more...), sample distracted driving policies for employers, sample school announcements, sample press releases, a pledge form, and sample editorial columns.

Phone in One Hand Ticket in the Other

U.S. Department of Transportation

The theme of the campaign messaging closely reflected the campaign name and consisted of conveying that law enforcement would be increasing the focus on distracted driving and drivers that text while driving will receive a ticket. The campaign website provided animated banner ads, logos, posters, and scripts for radio ads.

Put It Down DNT TXT N DRV

Florida Department of Transportation

According to the website, this campaign aimed to help drivers: (1) understand the problem of distracted driving; (2) recognize the risk and consequences associated with distracted driving; (3) implement specific steps to help eliminate distracted driving within families, schools, businesses, or organizations; (4) keep themselves and others safe on roadways; and (5) understand Florida distracted driving laws. Campaign material included a video The Hazards of Distracted Driving, showing the prevalence of distracted driving on a Florida freeway and distraction related crash/fatality statistics, posters, social media posts, a distracted driving fact card, sample email blasts, and a campaign schedule.

Remembering Ally

Transportation Improvement Association

This campaign and its website were primarily focused on promoting anti-texting legislation. The website provided videos (testimonials about Ally and a driver imprisoned for distracted driving and a simulation of a distracted driving crash), tips for avoiding distracted driving, a campaign poster, and information about becoming an advocate for the campaign.

Stop the Texts. Stop the Wrecks

Ad Council

The Ad Council partnered with NHTSA to create this campaign that aimed to convey that all distracted driving is dangerous for every driver, all the time. To avoid the consequences of distracted driving, drivers must avoid distracted driving. The campaign website included videos (mixture some using humor and others using emotion/fear), statistics (distracted driving prevalence, number and rates of distraction-related crashes, number and rates of distraction-related fatalities and injuries), and tips to avoid distracted driving. All information presented on the website was packaged for social media posting.

Talk. Text. Crash.

Texas Department of Transportation

According to the website, this campaign was aimed at raising awareness of the dangers associated with distracted driving and encouraging drivers to put away their cell phones while driving. The website provided a definition of distracted driving, tips to avoid using a cell phone while driving, encouragement to take the AT&T *It Can Wait* pledge (with a link to the pledge), billboards, gas pump toppers, window clings, beverage clings, 15- to 30-second videos (celebrity testimonial Scary, non-celebrity real person testimonial, humorous depictions, and victim tributes), videos for social media showing humorous ways of silencing the cell phone before driving, photos, radio ads (Last Words, celebrity testimonial Scary), information cards (with distracted driving statistics and tips for avoiding using a cell phone while driving), posters, note pads, and large banners. Several different messages were conveyed in the various material, but all contained the *Talk. Text. Crash.* tagline.

Think! Mobile Phones

U.K. Department of Transport

This campaign aimed to convey the message that using a cell phone while driving has risk to life and risk to your license. The website provided statistics about distracted driving (prevalence of cell phone use while driving, prevalence of drivers receiving penalties for violating cell phone laws, public perceptions about the likelihood of legal consequences for using cell phones while driving), videos (various lengths of *Life Without Zoe*), a poster (Make the glove compartment the phone compartment), audio clips of drivers making various excuses for using cell phones while driving, and a pledge to avoid driving distracted.

U Drive. U Text. U Pay.

U.S. Department of Transportation and Oklahoma Department of Transportation

The U.S. Department of Transportation campaign was designed to be implemented during National Distracted Driving Awareness Month (April) to raise awareness about the consequences of texting while driving. Material provided on the website included fact sheets, sample news releases and OpEd columns, campaign logos, animated banner ads, animated information graphics, sample campaign plans, posters, television ads, and web videos. Written material provided statistics about distracted driving (number of distraction-related crashes and deaths, prevalence of distracted driving), information about distraction-related laws and consequences, and information about enforcement efforts. Visual material included images of distracted drivers, distraction-related crashes (crashes occurring, crash scenes, and crash victims).

The Oklahoma Department of Transportation campaign appeared to have been implemented in 2015 to promote a new State law texting ban. The website provided information about the new law, distracted driving statistics (prevalence of texting and cell phone use while driving, number of distraction-related deaths and injuries, amount of time texting takes eyes off the road with a comparison to the length of a football field, the portion of younger distracted drivers), a 30 second television ad from the USDOT program showing a carful of distracted young people in a graphic crash with a truck, and a 30-second television ad about the texting ban. The campaign encouraged viewers to print, sign, and keep the NHTSA distracted driving pledge and provided a link to the pledge.

X The Text

Allstate Insurance

This was a Facebook page (no longer active) that encouraged teens to take a pledge to not drive distracted. The campaign consisted primarily of people posting their pledges to *not text and drive* to the Facebook page. The message TXTNG KLLS was displayed prominently on the page.

Zero Fatalities: Distracted Driving

Utah Zero Fatalities

This campaign intended to education people about the dangers of distracted driving. The website provided videos (Reggie Shaw's *Story* about a Utah driver who killed two men while texting and driving, Texting and Walking Theater showing humorous consequences of people walking and texting, The Messenger showing a family being notified of a loved one's fatal crash), a definition

and examples of distracted driving, statistics of distracted driving prevalence and crash rates, and tips for preventing distracted driving.

Impaired Driving Campaigns

15 Minutes

South Dakota Office of Highway Safety

This campaign conveyed the message that for a small commitment (15 minutes), one could serve as a designated driver and save lives. The website provided a video (*15 Minutes a Night* modeling recognizing and offering an impaired driver a ride) and grim reaper-themed products available for purchase (back scratcher, air freshener, calendar).

Arrive Alive: Drive Sober

Arrive Alive (Ontario, Canada)

The campaign promoted the social norm of driving sober (and that driving sober would prevent crashes and allow drivers to arrive alive) and encouraged drivers to plan ahead for a safe ride home if they would be drinking. The website provided audio clips for radio ads, news releases, social media posts via Twitter, products (e.g., *Arrive Alive* drink coasters), information and tips for planning safe rides (e.g., have a designated driver, call a taxi, take public transit), and a ride app to help users plan safe rides home.

Booze It & Lose It

Tennessee Highway Safety Office and North Carolina Governor's Highway Safety Program

The Tennessee campaign was a statewide campaign run to coincide with NHTSA's *Drive Sober or Get Pulled Over* campaign. The website provided impaired driving data and statistics (Tennessee crash data and NHTSA fact sheets), a sample press template, infographics, videos featuring testimonials from people affected by impaired driving, and links to NHTSA's campaign.

The purpose of the North Carolina campaign was to raise awareness about the dangers and legal consequences of impaired driving. The main theme of the reviewed campaign was 20 stories for 20 years. See the stories. Learn the lessons. The website provided videos featuring the stories of people affected by impaired driving, an active counter of the number of impaired driving fatalities in North Carolina during the campaign year, and information about North Carolina's impaired driving laws.

Buzzed Driving Is Drunk Driving

U.S. Department of Transportation and the Ad Council

According to the website, this campaign focused on social norming to prevent impaired driving with an emphasis on the message that any amount of alcohol before driving is dangerous. The website provided material for specific campaigns (4th of July, Cinco de Mayo, Halloween, Holiday Season, Mardi Gras, Super Bowl, Thanksgiving Eve, and the Ad Council's campaign). In general, the campaigns included interactive website banner ads, fact sheets, sample news releases, jpg images featuring impaired driving statistics, static infographics, logos, audio clips for radio ads, and videos using humor to depict being buzzed.

Don't Risk It
Road Safety Scotland

This campaign conveyed three messages: (1) there is zero tolerance for alcohol-involved driving of any level (one drink is too much); (2) the breathalyzer is never wrong; and (3) the consequences are severe for impaired driving. The website provides videos, statistics about impaired driving, information about Scotland's blood alcohol concentration limit and impaired driving laws, encouragement and tips for planning ahead (including links and contact information for transportation options), tips for reporting impaired driving by others, myths about impaired driving, and interactive graphics.

Drive Sober or Get Pulled Over
U.S. Department of Transportation and Wisconsin Department of Transportation

The USDOT campaign highlighted the constant presence of law enforcement searching for impaired drivers to prevent impaired driving. The website provided material for specific campaigns (4th of July, Holiday Season, National Mobilization, and Saint Patrick's Day), and the general campaign. Material provided for the various campaigns included videos showing people being pulled over (they'll see you before you see them) and the consequences (legally and financially), audio clips for radio ads, posters featuring the tagline and images of people being arrested, and a sample Federal media plan.

In the Wisconsin campaign, the website featured two series of videos to prevent impaired driving in Wisconsin while promoting the nationwide *Drive Sober or Get Pulled Over* campaign. The first series was called *Daredevils Dare Not*. It consisted of seven television ads, seven behind the scenes interviews, and two interviews featuring stunts and personal stories from Wisconsin extreme sports athletes (roller derby athletes, snowmobilers, skateboarders, and BMX bikers) conveying the message that it would be crazy to drive impaired. The second series was *How Will It Feel?*. It consists of four videos depicting an embarrassed driver facing the consequences of impaired driving in four scenarios (being pulled over, undergoing a field sobriety test, being arrested, and using an ignition interlock in front of a colleague). Audio clips for radio ads were provided for both series.

ENDWI; Buzzkill
New Mexico Department of Transportation

This campaign was targeted to people who sell or serve alcohol to inform and encourage them to help prevent impaired driving. The website provides information about New Mexico laws regarding the responsibility of alcohol providers with an emphasis of their shared responsibility to prevent impaired driving, information and tips (checking identification, enforcing invalid identification, detecting impaired people, preventing impaired people from driving), videos (campaign awareness and server training), campaign posters, and links to resources from other organizations.

Faces of Drunk Driving
Texas Department of Transportation

This campaign used several videos featuring the stories of people involved in impaired driving-related crashes (drivers, passengers, family members of victims, etc.). The videos provide

information about the risk related to impaired (primarily via fear and emotion-based appeals), motivation to avoid it, and actions that can be taken to avoid driving impaired. In addition to the video content, the website includes a section titled What you can do that provided tips for preventing/avoiding impaired driving, an online form to share stories, and a sample press release about the campaign.

Plan 2 Live

Montana Department of Transportation

This campaign encouraged the audience to plan ahead for a safe ride to avoid driving impaired. The website provided a 30-second video that depicted a rider-less horse walking to a bar to pick up a man that had been drinking and several strategies for planning a safe ride home (e.g., designate a driver, arrange a pick-up, program ride options into cell phone, use a ride program, spend the night, call a cab).

Safe Sober Prom Night

North Carolina Law Firm

This campaign was designed to encourage teen drivers to take a pledge to stay safe and sober on prom night. The website provided videos that included statistics about the number of impaired driving arrests in North Carolina and messaging that if you drive impaired you are a criminal, impaired driving rates increase during prom season, and that one night of impaired driving can negatively impact your life. The website included an online pledge, information about a t-shirt design contest, a link to the campaign's Facebook page, a Facebook photo gallery, campaign posters, and news releases/media coverage.

Sober or Slammer

South Carolina Department of Public Safety

This campaign conveys the serious consequences of impaired driving (physically, emotionally, legally, and financially) in an appeal to drivers to avoid the behavior themselves and to all people to recognize and report impaired drivers. The website provides videos (*Highways or Dieways, Sober or Slammer! Emoji, What Will Be Taken?, Drink Drive Die*), facts about impaired driving (nationally and in South Carolina), information about South Carolina's impaired driving laws, information about how to spot an impaired driver, information about how to protect oneself from an impaired driver, and a question-and-answer section.

Think! Drink Driving

U.K. Department of Transport

Videos presented a fear appeal depicting the likely, severe consequences of impaired driving coupled with modeling of the desired behavior for preventing impaired driving (e.g., doghouse video, *Malcolm and Brendan, mate doesn't let a mate drive drunk*). Some videos also portrayed how to cope with obstacles in preventing impaired driving. Written advice for preventing impaired driving is also presented on the website. The website provided videos, audio clips, posters, statistics about the prevalence and consequences of impaired driving, advice for preventing impaired driving (self and other drivers, with an emphasis on other drivers).

What Will YOU Lose?

Colorado Department of Transportation

This campaign used stories about real people to convey the serious consequences of impaired driving. The website provided videos featuring impaired-driving offenders sharing what they've lost because of their conviction and urging others not to do the same, campaign posters featuring the offenders, information about Colorado's impaired-driving laws, and statistics about impaired-driving convictions in Colorado. The campaign also included social media with a feature on the website allowing viewers to post comments.

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