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Effective Communication Message Strategy for Enhancing Traffic Safety in Fresno County: The Role of Time Horizon, Regulatory Focus, and Perceived Personal Control

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CSUTC California State University Transportation Consortium

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REPORT 20-17

EFFECTIVE COMMUNICATION MESSAGE STRATEGY FOR ENHANCING TRAFFIC SAFETY IN FRESNO COUNTY: THE ROLE OF TIME HORIZON, REGULATORY FOCUS, AND PERCEIVED PERSONAL CONTROL

Samer Sarofim, PhD

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16. Abstract

This research empirically investigated the differential effect of message framing on message recipients' attitudes and intended behaviors related to pedestrian, cyclist, and motorist traffic safety practices. The framework empirically investigated time horizon (expansive vs. limited) and regulatory focus (prevention vs. promotion) message framing.

The time horizon in the message can make someone either think of the future (expansive) or the present (limited). For example, an expansive time horizon message communicates that life is long and directs the focus on the future. On the contrary, a limited time horizon message communicates that life is short and directs the focus on the present moment. The regulatory focus of the message can direct the message recipients' attention to take certain action to either avoid negative consequences (prevention) or attain positive outcomes (promotion).

The research examined the role of the individual difference of perceived personal control on the perceptions of the presented messages and behavioral intentions to adopt safe transportation practices. Various messages were designed to employ a multilayer framing and fit with a 2 (time horizon: expansive vs. limited) x 2 (regulatory focus: promotion vs. prevention) between-subjects design. Findings suggest the messages adopting the expansive and promotion-focused framing combination seem to be more effective and have a higher tendency to induce positive intentions to act safe on the road for both pedestrians and motorists. Also, perceived personal control serves as a positive significant predictor of various safety-related motivations and intended behaviors. This research experimentally studied the differential effects of time horizon and regulatory focus framing on advancing traffic safety throughout effective messaging, an endeavor that shall benefit transportation authorities, city administrators, policymakers, and the general public. The tested message framing can be adopted in various forms, including text message, billboards, road signs, flyers, educational workshops, etc.

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EXECUTIVE SUMMARY

The motivation for this research stemmed from multiple recent meetings with a variety of transportation stakeholders including Fresno Council of Government, California Department of Transportation (Caltrans) District 6, and City of Fresno Public Works Department. Discussions about the role of effective messaging in changing public attitudes and behaviors to increase traffic safety indicated the lack of a cohesive messaging strategy. Current messages, and their framing, seem to be conducted on an ad-hoc basis and forego the benefit of building on the vast academic research on message strategy and framing. This research is aimed at identifying effective messaging strategies and framing that shall induce attitudinal and behavioral changes rated to traffic safety.

Fresno, due to its high rate of pedestrian and bicyclist fatalities, is selected as a focus city. The Federal Highway Administration has included Fresno in the list of cities with the highest bicycle and pedestrian fatalities since 2015. The Focus Cities Program in California, a joint program between UC Berkeley Safe TREC and California Walks, aims at supporting community efforts geared towards the development of safe walking and biking communities and programs.

Message framing has increasingly attracted both scholars' and practitioners' attention, as it influences various behaviors.[1] For instance, message framing has been found to affect consumers' decision making when buying, using, or recommending health care products, and it has been found that positive and negative framing messages are more effective for prevention and detection products, respectively.[2] Similarly, Wu et al. illustrated the differential effect of message framing on the effectiveness of dietary supplement advertisements.[3]

This research investigates the effectiveness of different messaging strategies and frames that are aimed at inducing safer behaviors among pedestrians, cyclists, and motorists. The framework empirically investigates time horizon (expansive vs. limited) and regulatory focus (prevention vs. promotion) framing. The author experimentally studies the differential effects of time horizon and regulatory focus message framing on advancing traffic safety, an endeavor that shall benefit the public, transportation authorities, city administrators, and policy makers.

Findings suggests that the utilization of expansive horizon time framing and promotion-focused messaging could lead to higher perceptions of message credibility and greater intentions to act safely on the roads. Also, the individual difference of perceived personal control was significantly correlated with various safety behavioral intentions, suggesting that future research would benefit from message framing that heightens the sense of personal control.

Decision makers will be able to use the results of this research to effectively allocate communication efforts and spending to induce attitudinal and behavioral change that shall enhance the safety of active transportation modes.

I. METHODOLOGY

DESIGN

The messages were designed to fit with a 2 (time horizon: expansive vs. limited) 2 (regulatory focus: promotion vs. prevention) between-subjects design. The time horizon manipulation was adapted from Williams and Drolet.[4] For the complete messages, see Appendix A. Participants were randomly assigned to see one of the four messages. The content of the four messages was slightly modified to suit the participants' indicated main mode of transportation (motorists vs. cyclists and pedestrians) that was included in the initial screening questions.

PROCEDURE

Participants were randomly assigned to see one of the four messages. After reading the message, participants completed a set of related appeal, attitudinal, and behavioral intentions questions and scales. Questions included participants' perceptions about message credibility (1–7; anchored on 1 = "Not at All" and 7 = "Very Much") and perception of the message's ability to deter others from speeding (1–5; anchored on 1 = "Strongly Disagree" and 5 = "Strongly Agree"); scales were adapted from Tay and De Barros.[5]

The likelihood of the message causing participants to exercise more caution while crossing (1–7; anchored on 1= "Extremely Unlikely" and 7 = "Extremely likely") was adapted from Glendon and Walker, and the scale of agreement for whether the message would make participants monitor drinking while driving (1–5; anchored on 1= "Strongly Disagree" and 5 = "Strongly Agree"), adapted from Lewis, Watson, & Tay, was also included.[6]

A scale was adapted from Lewis, Watson, and White to assess the usefulness of message information for how people can reduce their risk of pedestrian and cycling accidents; message effectiveness in providing a strategy (or strategies) in reducing pedestrians' and cyclists' accidents; and effectiveness of adopting the message's recommendations in reducing accidents involving pedestrians and cyclists using a 1–7 scale (anchored on 1= "Strongly Disagree" and 7 = "Strongly disagree") .[7]

The belief that the message would be effective in reducing pedestrians' and cyclists' accidents in general was measured using a 1–5 scale (anchored on 1= "Not at All Effective" and 5 = "Very Effective"), adapted from Glendon and Cernecca.[8] Participants also completed individual differences scales, and among those scales was a four-item perceived personal control individual difference scale (α = .86), adapted from Lachman and Weaver: see Appendix B.[9] Demographics were finally collected.

SAMPLE

Quota sampling was used to ensure equal gender distribution (50% males, 50% females) and maximize efforts to include participants from the 15 cities in Fresno County. Also, sampling attempted to map onto the population proportions of the 15 cities. The sample is composed of 400 respondents from Central California, recruited via a marketing research firm to complete

the study. Detailed Sample characteristics are shown in Table 1.

Table 1. Sample Characteristics

Characteristic	Percentage	Characteristic	Percentage	Characteristic	Percentage
City Population		**Ethnicity**		**Education**	
Clovis	16.5	American Indian or	2.8	Less than high	6.5
Coalinga	1.8	Alaska Native	35.0	school	25.5
Firebaugh	0.3	Hispanic/Latino	7.2	High school gradu-	5.8
Fowler	1.3	Black or African	1.0	ate (or GED)	27.8
Fresno	59.5	American	40.3	Vocational or tech-	10.3
Huron	0.8	Native Hawaiian or	6.8	nical training	14.5
Kerman	2.0	Pacific Islander	3.3	Some college (no	7.0
Kingsburg	2.5	White Caucasian	1.3	degree)	2.8
Mendota	1.0	Asian	2.5	Two-year college	
Orange Cove	1.0	Multiracial		degree	
Parlier	1.8	Other		Bachelor's degree	
Reedley	3.8	Prefer not to answer		Master's degree	
San Joaquin	0.8			Doctoral degree	
Sanger	3.8			(PhD, JD, MD, etc.)	
Selma	3.5				
Age		**Total Annual**		**Employment**	
18 to 24	23.5	**Household Income**	43.0	**Status**	34.3
25 to 34	29.5	Less than $30,000	19.8	Working full-time	16.3
35 to 44	20.8	$30,000 to $49,999	15.3	Working part-time	6.8
45 to 54	11.0	$50,000 to $74,999	7.5	Self-employed	8.8
55 to 64	8.0	$75,000 to $99,999	5.5	Homemaker or	11.3
65 or older	7.2	$100,000 to	4.3	stay-at-home par-	10.5
		$124,999	1.5	ent	1.0
		$125,000 to	0.8	Student	6.5
		$149,999	2.5	Out of work, but	0.3
		$150,000 to		looking for work	9.5
		$199,999		Out of work, but not	
		$200,000 to		looking for work	
		$249,999		Unable to work	
		$250,000 or more		(e.g., disability)	
				Military	
				Retired	
Gender		**Main Mode of**			
Male	50	**Transportation**	80		
Female	50	Motorists	18		
		Pedestrians and	2		
		Cyclists			
		Other			

II. FINDINGS

The regulatory focus of the message showed a differential significant main effect on perceptions of a message's ability to reduce pedestrians' and cyclists' accidents in general, perception of a message's ability to deter others from speeding, and the likelihood of the message causing participants to exercise more caution while crossing.

One-way ANOVA testing (see Table 2 for all ANOVA results) showed that when compared to prevention-focus message framing, promotion-focus message framing demonstrated more positive perceptions of the message's ability to reduce pedestrians' and cyclists' accidents in general (see Figure 1).

Similarly, compared to those participants under the prevention-focus condition, motorist participants under the promotion-focus condition indicated higher perceptions of a message's ability to deter others from speeding (see Figure 2).

Also, pedestrian participants under the promotion-focus condition expressed more likelihood that the message would make participants exercise more caution while crossing compared to those under the prevention-focus condition (see Figure 3).

The time horizon manipulation of the message showed a significant main effect on motorist participants' agreement that the message would lead participants to monitor drinking while driving, where the expansive time horizon manipulation showed more positive results than the limited time horizon manipulation (see Figure 4).

A two-way ANOVA revealed significant interaction between time horizon manipulation and regulator focus manipulation on participants' perception of message credibility (see Figure 5). The message framing that combines the promotion-focus and expansive time horizon showed the highest perceptions of message credibility.

The three items assessing message effectiveness adapted from Lewis, Watson, & White showed high inter-scale reliability ($\alpha = .84$), and hence they averaged into a single measure that indicates the overall message effectiveness.[10] A two-way ANOVA revealed a significant interaction between time horizon manipulation and regulator focus manipulation on participants' perception of message effectiveness (see Figure 6). The message framing that combines the promotion-focus and expansive time horizon showed the highest perceptions of message effectiveness.

Perceived personal control showed significant positive correlations with people's perceptions about the overall message effectiveness and the message's ability to reduce pedestrian and cycling accidents in general, deter other drivers from speeding, make people exercise more caution while crossing, and encourage people to monitor drinking while driving (see Table 3).

Table 2. ANOVA – The Effect of Prevention vs. Promotion Regulator Focus Message Framing

		Mean	Std. Deviation		Sum of Squares	df	Mean Square	F	Sig.
Message's ability to reduce pedestrians' and cyclists' accidents in general	Prevention Focus	3.35	1.15	Between Groups	6.546	1	6.546	4.981	.026
Promotion Focus	3.61	1.14	Within Groups	523.032	398	1.314			
Total	3.47	1.15	Total	529.578	399				
Message's ability to deter others from speeding	Prevention Focus	3.23	.99	Between Groups	5.367	1	5.367	5.348	.021
Promotion Focus	3.49	1.00	Within Groups	319.130	318	1.004			
Total	3.35	1.01	Total	324.497	319				
Message would make participants exercise more caution while crossing	Prevention Focus	4.72	1.99	Between Groups	18.128	1	18.128	5.730	.019
Promotion Focus	5.68	1.49	Within Groups	246.759	78	3.164			
Total	5.16	1.83	Total	264.887	79				

ANOVA – The Effect of Expansive vs. Limited Time Horizon Framing

		Mean	Std. Deviation		Sum of Squares	df	Mean Square	F	Sig.
Motorist participants' agreement that the message would lead participants to monitor drinking while driving	Limited Time Horizon	6.07	1.61	Between Groups	10.510	1	10.510	5.598	.019
Expansive Time Horizon	6.43	1.07	Within Groups	596.987	318	1.877			
Total	6.25	1.38	Total	607.497	319				

Two-way ANOVA: The Interaction Between Time Horizon Manipulation and Regulator Focus

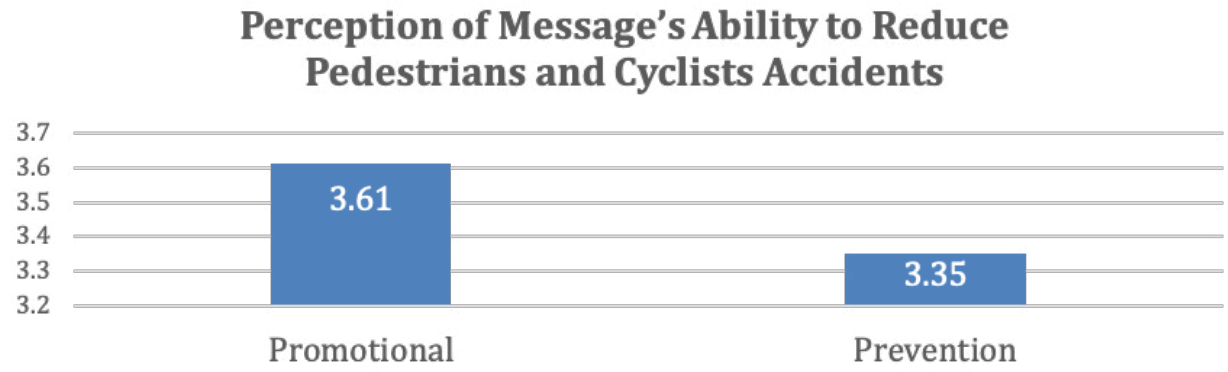
		Mean	Std. Deviation		Type III Sum of Squares	df	Mean Square	F	Sig.

			Mean	Std. Deviation		Sum of Squares	df	Mean Square	F	Sig.
Message Credibility	Promotion Focus message	Limited Time Horizon	5.68	1.50	Regulatory Focus	.262	1	.262	.132	.717
	Promotion Focus message	Expansive Time Horizon	6.10	1.28	Time Horizon	.940	1	.940	.474	.492
	Prevention Focus message	Limited Time Horizon	6.05	1.30	Interaction	9.932	1	9.932	5.007	.026
	Prevention Focus message	Expansive Time Horizon	5.83	1.51	Error	785.514	396			
					Total	14744	400			
Message Effectiveness	Promotion Focus message	Limited Time Horizon	5.22	1.32	Regulatory Focus	5.111	1	5.111	3.171	.076
	Promotion Focus message	Expansive Time Horizon	5.46	1.12	Time Horizon	.221	1	.221	.137	.712
	Prevention Focus message	Limited Time Horizon	5.28	1.28	Interaction	7.915	1	7.915	4.91	.027
	Prevention Focus message	Expansive Time Horizon	4.95	1.32	Error	638.298	396	1.612		
					Total	11516.222	400			

Table 3. Correlations Between Perceived Personal Control and Dependent Variables

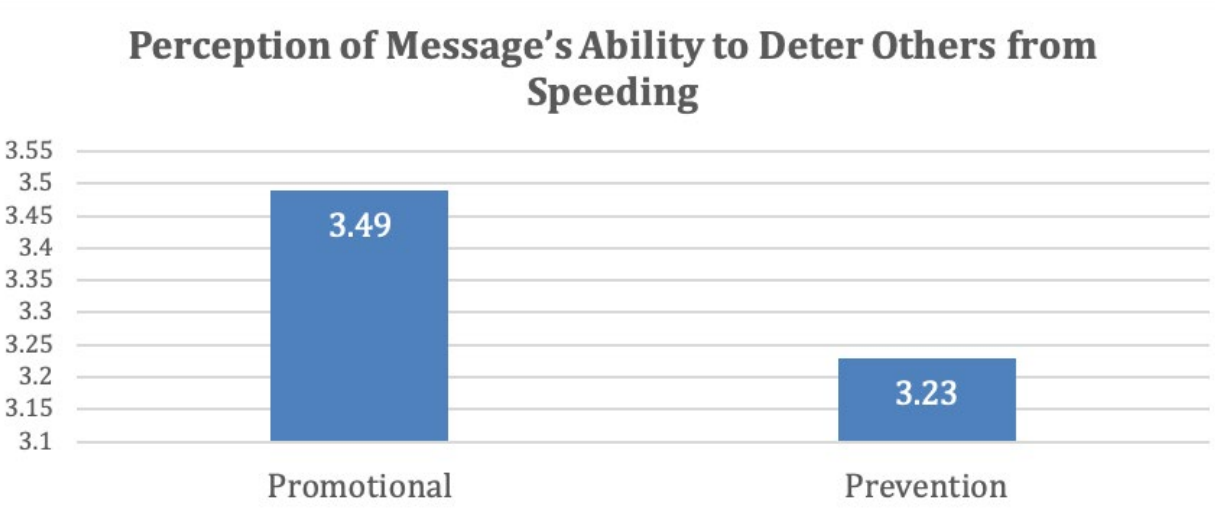
		Reduce pedestrians and cyclists' accidents in general	Deter other drivers from speeding	Exercise more caution while crossing	Monitor drinking while driving	Message Credibility	Message Effectiveness
Perceived Personal Control	Pearson Correlation	.311**	.342**	.586**	.252**	.357**	.458**
	Sig. (two-tailed)	.000	.000	.000	.000	.000	.000

***. Correlation is significant at the 0.01 level (two-tailed).*



P < .05

Figure 1. The Differential Effect of Regulatory Focus of the Message on Perception of Message's Ability to Reduce Pedestrians and Cyclists Accidents



P < .05

Figure 2. The Differential Effect of Regulatory Focus of the Message on Perception of Message's Ability to Deter Others from Speeding

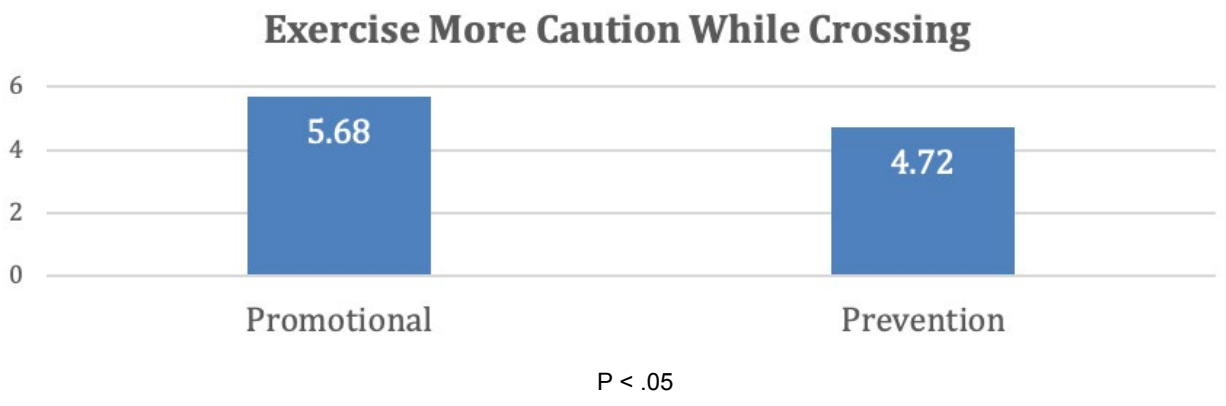


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Figure 3. The Differential Effect of Regulatory Focus of the Message on the Likelihood of the Message to Make Participants Exercise More Caution While Crossing

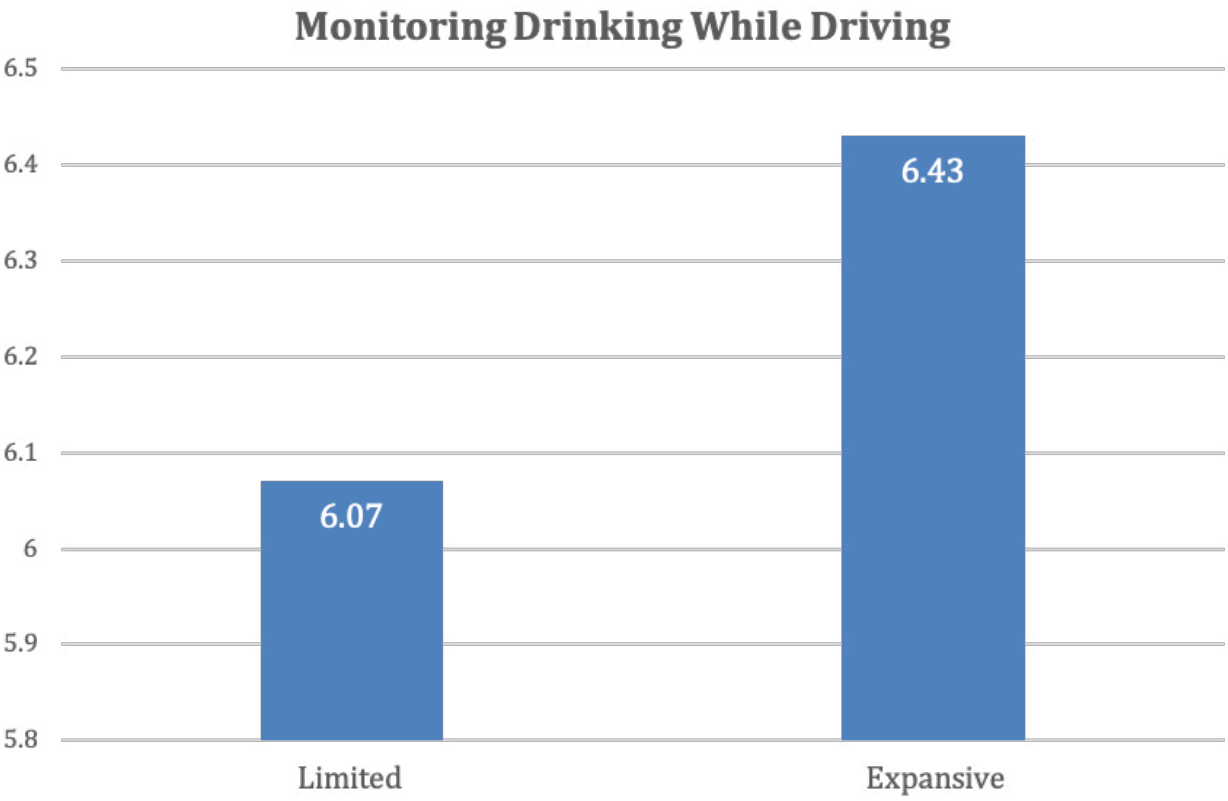

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Figure 4. The Differential Effect of Time Horizon of the Message on Participants' Agreement that the Message Would Make Participants Monitor Drinking While Driving

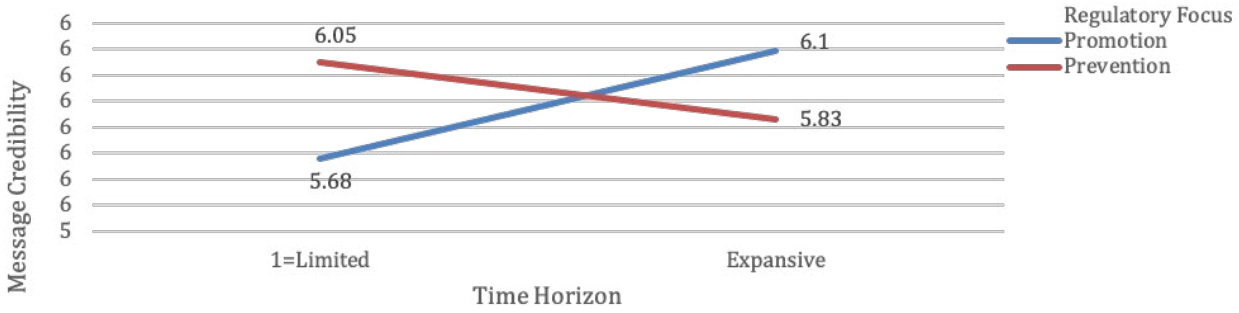

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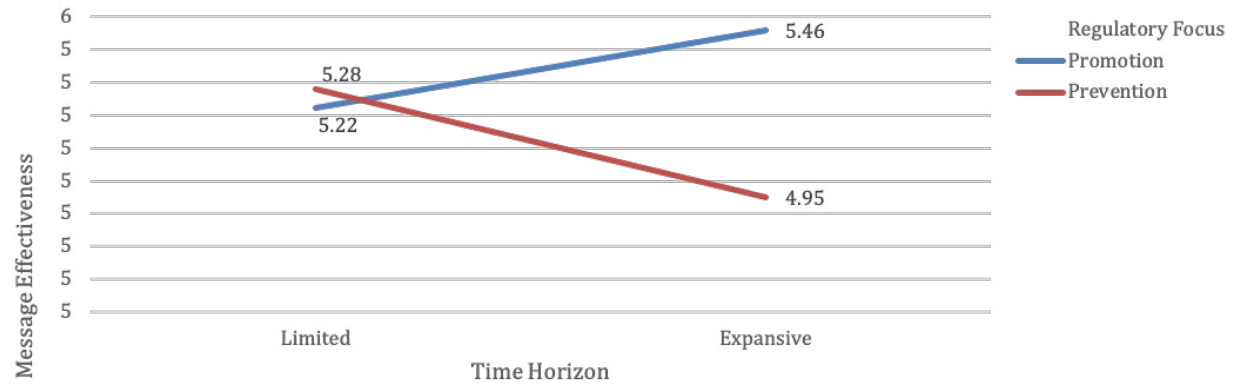
Figure 5. The Interaction Effect of Regulatory Focus and Time Horizon on Message Credibility



P < .05

Figure 6. The Interaction Effect of Regulatory Focus and Time Horizon on Message Effectiveness

III. CONCLUSIONS AND RECOMMENDATIONS

Findings suggest that message framing could lead to differential effects when promoting transportation safety. The perceived message credibility and effectiveness (e.g., providing useful information, communicating effective strategies, and the applicability of adopting the message strategies) were perceived differently depending on whether the message was designed with expansive vs. limited time horizon or promotion- vs. prevention-focused framing. Also, the message framing influences essential transportation safety practices. For instance, intentions to monitor drinking when planning to drive were affected by the time horizon manipulation of the message. When expansive time horizon is used (e.g., life is long), participants showed significantly higher intention to monitor drinking when planning to drive than when the limited time horizon message is used (e.g., life is short).

Continuing to demonstrate the effect of message framing on transportation safety intended behaviors, findings suggest that promotion-focused messages tend to be more effective than prevention-focused messages. The perception of the message's ability to reduce pedestrians' and cyclists' accidents was higher for the promotion-focused messages than for the prevention-focused messages. Similarly, perceptions about the message's ability to deter other drivers from speeding was higher among participants presented with the promotion-focused message than those who were presented with the prevention-focused message. Also, the essential safety practice of exercising caution while crossing was affected by the regulatory focus (promotion vs. prevention) of the message, where the promotion-focused message continued to show more favorable effects.

This research and its findings suggest that the prevention-focused messaging could be more effective than prevention-focused messaging when promoting transportation safety. Furthermore, transportation safety messages that promote recipients' thinking of time as more expansive (versus limited) seem to have more favorable effects.

Importantly, when considering the integration of both regulatory focus and time horizon framing in the same message, the combination of expansive time horizon and promotion-focus tends to have the most favorable effects on the perceived message credibility and effectiveness, providing transportation authorities with directions in message framing to yield the desirable safety-related effects.

APPENDIX A: MESSAGES

Time Horizon Manipulation (adapted from Williams and Drolet 2005)		
Expansive	Because Life is Longer than You Think, Focus on what's Yet to Come	Each message randomly presents one of the time horizon manipulations at the beginning
Limited	Because Life is Shorter than You Think, Focus on the Moment	
Body of the Message		
Motorists	Pedestrians and Cyclists who run into the street without first looking for oncoming vehicles do not give drivers adequate time to see them and have difficulty performing an adequate search. Furthermore, by running before they know it is safe, they reduce the time they have to react to an unexpected car in their path. Slow Down and Look for Pedestrians & Cyclists	The body of the message was selected based on each participant's indicated main mode of transportation in the screening questions in the beginning of the study
Pedestrians and Cyclists	Pedestrians and Cyclists who run into the street without first looking for oncoming vehicles do not give drivers adequate time to see them and have difficulty performing an adequate search. Furthermore, by running before they know it is safe, they reduce the time they have to react to an unexpected car in their path. Cross Safely	
Regulatory Focus Manipulation		
Promotion	Save A Life	Each message randomly presents one of the regulator focus manipulations at the end
Prevention	Do Not Waste A Life	

APPENDIX B: PERSONAL CONTROL SCALE, ADOPTED FROM LACHMAN AND WEAVER (1998)

I can do just about anything that I really set my mind to.

Whatever happens in the future mostly depends on me.

When I really want to do something, I usually find a way to succeed at it.

Whether or not I am able to get what I want is in my own hands.

All items are measured on a 7-point scale (1 = “Strongly Disagree” to 7 = “Strongly Agree”)

ENDNOTES

1. Mary A. Gerend and Margaret Cullen, "Effects of Message Framing and Temporal Context on College Student Drinking Behavior," *Journal of Experimental Social Psychology* 44 (2008): 1167–1173; Alexander J. Rothman, et al., "The Strategic Use of Gain- and Loss-Framed Messages to Promote Healthy Behavior: How Theory Can Inform Practice," *Journal of Communication* 56 (2006): 202–220.

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PEER REVIEW

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