Review of the CRISP Publicity Campaigns

Final Report

Submitted to

Capital Region Intersection Safety Partnership

Submitted by

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CRISP
CAPITAL REGION INTERSECTION SAFETY PARTNERSHIP

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Acknowledgement

The Capital Region Intersection Safety Partnership (CRISP) identified a need to review and enhance publicity campaigns being completed bi-annually. The objectives and outcomes for the following work were therefore initiated and defined by CRISP with the author undertaking the research presented in this document.

CRISP comprises the following traffic safety and injury prevention stakeholders:

- Alberta Motor Association
- Capital Health
- City of Edmonton
- City of St. Albert
- Edmonton Police Service
- St. Albert RCMP Detachment
- Strathcona County RCMP Detachment
- Strathcona County

The author thanks CRISP for the generous financial support for the project. The views expressed in the report by the author, however, do not necessarily reflect those of the organizations above.

Table of Contents

Executive Summary

Road crashes are a leading cause of deaths and injuries in Canada and extract a huge cost on society. Among the different types of roadways, intersections are recognized as being one of the most hazardous locations on the roads. For example, over the past 5 years, the City of Edmonton has averaged approximately 21,350 total collisions annually, resulting in approximately 6,850 injuries, 22 fatalities and $ 78,000,000 in property damages per year. Also, about 55 % of these collisions have occurred at intersections, accounting for 66% of the total injuries and 42 % of the total fatalities reported (Cebryk and Bell, 2004).

To address the critical problems associated with intersection safety, a number of agencies in the capital region around the City of Edmonton combined their efforts in 2001 to form the Capital Region Intersection Safety Partnership (CRISP). The aim of CRISP is to look at ways to combine education, engineering and enforcement strategies to make intersections in the capital region safer. In addition to engineering and enforcement measures such as the intersection safety camera program, CRISP has also developed and implemented a variety of publicity campaigns over the years.

A review of the literature found several examples of successful campaigns and useful best practice guidelines for conducting road safety campaigns. At the macro level, Kotler's social marketing model should be used to develop and plan a campaign. In developing a campaign, CRISP needs to conduct a SWOT analysis, determine the purpose and focus of the campaign, identify the target audience, establish a budget, apply the four Ps of marketing (place, price, product and promotion) to the social context, implement the plan and evaluate the outcome.

At the more micro level, there are many behavioral change models that can be used to assist CRISP in developing a successful message or advertisement. These models include the Functional Theory of Behavior, Theory of Planned Behavior, Persuasive Communications and the Elaboration Likelihood Model, Kotler's 4 Ps of Marketing, Trans-Theoretical Model of

Change, Health Belief Model, Fear Appeals, Social Cognition Model and Economic Model of Consumer Choice.

In general, most of the theoretical models target two things at varying degrees: threat associated with the risky behavior and the benefits associated with adopting the safe driving behavior. These constructs have to be clearly perceived by the audience as they form the central route of persuasion, which is the basic logical or rational motivation for change. The behavior targeted should be very specific and clearly illustrated in the message and the logic and arguments (actions and consequences) shown have to be realistic and convincing. In addition to the central route, the peripheral route of persuasive communications stresses the need for the message to be delivered in a credible manner and the use of an independent and trustworthy source will enhance the likelihood of the message being accepted. The use of emotion, such as fear, shame or guilt, to increase the drive for behavior should also be considered

In order to review the development, implementation and evaluation of the CRISP related media campaigns, information on intersection related collisions were collected from the City of Edmonton and the County of Strathcona. These data revealed that young drivers, especially young male drivers, had the highest collision rates per licensed drivers and should therefore form the primary target audience of any campaign. On the other hand, the middle-aged group had the highest number of collisions because of their larger share of the drivers on the roads. They should therefore form the secondary target audience of the campaigns.

With respect to the behavioral influence recorded in the collision database, left-turn-across-path and following-too-closely are the two most important contributing factors and should be the primary targets to reduce the number of crashes. However, left-turn-across-path crashes also tend to be more severe, thereby placing them ahead in priority. Regardless, since both these collision types are related to gap selection by drivers, messages that promote the use of the 3 seconds rule (or equivalent) may help to alleviate these safety issues. In addition, crashes involving vulnerable road users like pedestrians and cyclists also tend to be more severe and should be considered as a target group. The "Drive Alert - Walk Alert" campaign implemented in British Columbia can be

adapted for use in the capital region to reduce these types of crashes. In addition, education campaigns to increase pedestrian and cyclist conspicuity should also be considered.

A review of some existing posters used by CRISP in the past was also conducted using a simple questionnaire survey of a convenient sample of road safety professionals who attended the CRISP workshop. In general, the audience did not perceive a high likelihood and severity of the threat associated with the risky driving behaviors at intersections or a clear benefit associated with taking the necessary preventive action or safe driving behavior. It is recommended that the posters be re-designed to emphasize the linkage between the driver's action and its consequences. The use of collision photographs or pictures should be considered to increase the strength and logic of the argument against risky behaviors and/or to reinforce the benefit of adopting the safe behavior. As illustrations, two examples were provided on how to apply the behavioral change theories to redesign existing posters and develop new posters.

Many of the best practice guidelines reviewed recommended that the campaign be integrated with other traffic safety initiatives. For CRISP educational campaigns, the main initiatives that require coordination with, are the communications activities of the Alberta Traffic Safety Plan (ATSP) and the traffic enforcement activities taking place around the capital region. Although there is no evidence to suggest that integrating the CRISP campaigns with those of the ATSP will result in a net gain for CRISP, this proposal has high face validity and therefore, should be considered by CRISP. Monitoring and evaluation programs should be put in place to assess any benefit or cost of adopting this strategy.

In terms of integration with traffic law enforcement, some behaviors require both communications and enforcement to be effectively addressed whereas other behaviors can be targeted independently using either enforcement or education campaigns. In terms of behaviors that are prevalent at intersections, red light running is widely accepted as a risky behavior and hence enforcement alone can be effective in changing driver behavior without the need for education campaigns and vice versa. Other behaviors like speeding and following-too-closely are not as widely accepted as risky behaviors and enforcement alone is not likely to be effective in

the long term. Therefore, these types of enforcement activities should be accompanied by educational campaigns to increase their effectiveness.

Finally, as suggested by all the best practice guidelines reviewed, it is important that an evaluation and monitoring plan be developed and implemented. Several methods for evaluating social marketing campaigns have been proposed by the Johns Hopkins University Center for Communication Programs and a summary of these methods are provided in the report. It is recommended that CRISP adopts at least one of these methods. In particular, the pre-post data collection and analysis method and the panel survey method are highly recommended due to their ease of implementation. Examples using a similar method to evaluate some of the existing CRISP posters are also provided in this report.

1.0 Background and Objectives of Research

1.1 Introduction

Road crashes are a leading cause of deaths and injuries in Canada and extract a huge cost on society. In 2001, for example, motor vehicle collisions claimed the lives of 2,778 Canadians, in addition to causing 20,000 severe injuries and 220,000 minor injuries, resulting in an estimated social cost of more than $25 billion (Transport Canada, 2004). Consequently, governments at all levels and many of the major stakeholders are committed to initiatives to reduce the frequency and severity of traffic accidents. In an effort to reduce the road trauma, Transport Canada has formulated *Vision 2010*; the province of Alberta has developed the *Alberta Traffic Safety Plan*, and the capital region CRISP partner municipalities are currently working on traffic safety plans. These plans will form the basis of road safety measures to be implemented in the local communities, province and throughout Canada. One of the explicitly targeted areas in these strategic plans is a 20% reduction in crashes at intersections (Transport Canada, 2004; Alberta Transportation, 2004).

Like most urban regions, over 60% of all traffic injuries in the City of Edmonton occurred in crashes at intersections (Abdel-Aty, 2003, 2005; Tay & deBarros, 2006; Tay & Rifaat, 2007; City of Edmonton, 2007). In an effort to reduce crashes at intersections, many jurisdictions around the world, including the City of Edmonton, have relied on intelligent transportation systems and advanced technologies, such as red light cameras, to reduce the incidences of collisions at signalized intersections (TRB, 2003; AustRoads, 2004; Gains et al, 2003; Tay & deBarros, 2006). The efficacy of these intersection safety cameras has been widely evaluated and found to be effective in reducing collisions, especially side-impact crashes (Retting et al, 1999; Lum & Wong, 2003; Tay & deBarros, 2006).

To address the critical problems associated with intersection safety, a number of agencies in the Edmonton region combined their efforts in 2001 to form the Capital Region Intersection Safety Partnership (CRISP). The aim of CRISP is to look at ways to combine education, engineering and enforcement strategies to make intersections in Edmonton safer. In addition to engineering

and enforcement measures such as the intersection safety camera program, CRISP has also developed and implemented a variety of publicity campaigns over the years. These campaigns utilized a general exposure approach that used a combination of billboards, newspaper, transit, and radio advertisements. The use of road safety publicity campaigns is not new but their effectiveness have been a topic of constant debate (Tay & deBarros, 2007; Lewis et al, forthcoming, 2007a,b; Tay, 1999, 2001, 2002, 2004, 2005a,b,c; Tay & Watson, 2002; Tay & Ozanne, 2002; White et al, 2000; Oppe & Bijleveld, 2003; Macpherson & Lewis, 1998; Cameron et al, 1993, 1998, 2000; Elder et al, 2004).

The mixed results obtained from previous evaluations of road safety publicity campaigns are not surprising since few campaigns are developed with a solid foundation based on crash data analysis and established behavioral change models (Tay 2005a,b; Tay & Watson, 2002; Lewis et al, forthcoming). The importance of theory and evidence in developing a successful campaign can not be over-emphasized. Without a good understanding of the types of traffic violations and crashes involved, the factors contributing to these collisions, the driver groups involved, and their attitude towards the specific risky driving behaviors, it is difficult to design any theory based targeted campaign to change behavior and reduce traffic collisions. Although preliminary evaluations on specific parts of related programs have been conducted periodically for some of the CRISP campaigns (Banister, 2002a,b; Hamilton-Finn, 2004), there has yet to be a comprehensive assessment and review of the program.

1.2 Project Goals and Objectives

This project aims to review the development, implementation and evaluation of the CRISP related media campaigns. The review will also encompass literature review and background data with the following elements in mind:

- Review target market(s) and demographic profiles of our audience
- Review behavioral theories that support the campaign messages
- Provide examples of best practices and effective campaigns used elsewhere
- Recommend a rationale for future campaign directions

The review will provide guidelines and recommendations that will ensure that resources being allocated by CRISP for its media campaigns are theory and evidence based, as stated in its strategic plan. It will ensure that CRISP has successful designs and implementation of social marketing campaigns to raise awareness for improving road user attitudes and behaviors, with the ultimate goal of reducing traffic violations and collisions at intersections in the Alberta Capital Region.

1.3 Operational Plan and Project Activities

1.3.1 Literature Review

A comprehensive review of the literature on road safety publicity campaigns will be compiled. The review will include the current practices in Edmonton, Alberta and Canada and compare them with those adopted in countries such as Australia, New Zealand, United Kingdom and United States. It will also provide a synthesis of the research literature on the various theoretical models that are suitable for the design and implementation of road safety media campaigns as well as summarize the research findings on the effectiveness of road safety media campaigns. The review will include common campaigns like drink driving and speeding as well as specific campaigns like pedestrian collisions and red light running.

1.3.2 Compilation and Analysis of Data

Relevant traffic violation and collision data will be compiled and analyzed to determine the factors contributing to crashes along the major collision locations covered in the CRISP campaign. It will also serve to identify the target audience for the media campaigns. Identifying the correct driver behavior and driver groups to target is essential in the conceptual evaluation of any road safety countermeasure. The use of City of Edmonton and County of Strathcona data are agreed to by the sub-committee, and the City of Edmonton and County of Strathcona will provide data as required to undertake this work.

1.3.3 Selection of Theoretical Approaches

Once the target behaviors (mainly confirmation of red light running, speeding and pedestrian collision) and audience (age, gender, etc) have been identified through the data analysis, the appropriate theoretical approaches with a higher likelihood of success will be selected and further developed to meet the goals and objectives of the various media campaigns. For example, if it is deemed that fear appeal is recommended, then measures for the key constructs in models like the Extended Parallel Response Model (Fear arousal, response efficacy and self-efficacy) and appropriate behavioral measures (change in attitudes, intentions, self-reported behaviors, traffic speed, number of violations, etc) need to be defined.

1.3.3 Review of Existing Campaign Materials

A sample of the existing campaign materials will be examined and compared with the selected theoretical approaches. The importance of theoretical underpinning for research can not be over emphasized and one of the main objectives of this research is to develop a conceptual framework for the deployment of scarce media campaign resources that is grounded firmly on communications, psychology and behavior change models as well as data on violations and collisions. Once the measures are developed (see above), the existing campaigns will be evaluated using the various measures for both the presence of the key constructs as well as expected impact on driver behavior.

1.3.4 Report writing and deliverables

As an on-going process, a report detailing the rationale for the research, summarizing the relevant research literature, outlining the research objectives, describing the methodology used and discussing the results obtained will be prepared for final submission to CRISP. An executive summary will also be provided in the report. The report is expected to include the following:

- Identify target audiences and define each demographic profile for each of our targeted driving behaviors – speed, red light and pedestrian, and for pedestrian crashes, the target audience for both the driver and the pedestrian.

- Provide information on the types of messages and visuals that will resonate with the different target segments that will most likely lead to them changing their behavior.
- Provide behavioral theories that support the messages.
- Provide information on effective timing and media for campaigns (For examples, is there a specific time of day that collisions happen that we should target or is there a certain media that resonates more with specific target segments? Are there some best practices or regional stats that we can pull from?)

1.4 Further Development of Research

It is important that follow up research be conducted to evaluate the effectiveness of the media in changing drivers' attitudes and behaviors as well as violation rates and crash incidences. It is also important to conduct a process evaluation to assess the efficiency of the design, delivery and implementation of the campaign.

2.0 Review of Intersection Crashes and Target Audience

2.1 Introduction

2.1.1 Safety Issues at Intersections

Before analysing the target audience of the campaigns, it is worthwhile to briefly examine the general safety issues at intersections. Intersections are the locations within the road traffic network where two or more traffic flows converge and therefore, by their very nature, provide points of potential conflict. The successful negotiation of intersections is dependent upon careful attention to the road environment, which includes the adherence to the road traffic rules governing the entry into and the exit out of an intersection (Zaal, 1994). The decision to obey the road traffic rules is dependent upon a number of factors, which relate to:

- The driver: behavioural and attitudinal aspects as well as knowledge of the particular road environment, and the perceived risk of being detected
- The vehicle: traffic volume, traffic speed, speed and position of the particular driver within the traffic stream
- The road environment: lane width, number of lanes, turning lanes, traffic signal timing, road condition and time of day
- The social environment: includes attitudes towards speeding, red light running, enforcement and road traffic laws

2.1.2 Intersection Crashes in Edmonton

Given all these factors, it is not surprising that accidents at intersections continue to pose a significant road safety problem in many countries including Canada. A substantial proportion of motor-vehicle crashes occur at intersections, especially in urban areas. Over the past 5 years, the City of Edmonton has averaged approximately 21,350 total collisions annually, resulting in approximately 6,850 injuries, 22 fatalities and $ 78,000,000 in property damages per year.

Approximately 55 % of these collisions have occurred at intersections, accounting for 66% of the total injuries and 42 % of the total fatalities reported (Cebryk and Bell, 2004).

2.2 Literature on Intersection Crashes

2.2.1 Intersections as Hazardous Locations

Road crashes are a leading cause of deaths and serious injuries in many developed and developing countries. Intersections are recognized as being among the most hazardous locations on the roads (PIARC, 2003). For example, about 56% of all crashes in the United States occur at or near an intersection (Retting et al, 1995) and about 40% of all casualty crashes in Norway occur at junctions (Elvik & Vaa, 2004). In Singapore, the annual road crash statistics show that more than one-third of crashes (34.31%) occur at intersections (Tay & Riffat, 2007) and about 23% of the crashes in Bangladesh occur at different types of intersections (Barua & Tay, 2007). In addition, a review of 1,254 urban crashes in England found that almost 70% occurred at junctions (Carsten et al, 1989). Hence, the enhancement of road safety in both developed and developing countries requires a better understanding of the factors contributing to crashes and the profile of road users involved in crashes at these hazardous locations to develop more targeted countermeasures.

As intersections are the most common location for accidents, there has been much research on the design, implementation and evaluation of countermeasures to reduce the potential conflicts at intersections and to reduce collisions in these locations. Most of the studies have concluded that driver education, transportation engineering and traffic enforcement methods should be deployed in a coordinated approach. However, engineering solutions can often incur very large capital costs and if common sense does not prevail and road users cannot be educated to obey intersection traffic laws, then reliance is typically placed on enforcement to ensure road users' compliance (Zaal, 1994).

2.2.2 Engineering Studies of Intersection Crashes

There are usually several major engineering factors influencing collision occurrences at intersections including traffic characteristics, traffic control measures, geometric design and driver characteristics. Many of the engineering studies have examined the impact of traffic and geometric characteristics on the frequency of crashes at intersections including lane arrangement (Wang and Abdel-Aty, 2006), signal timing (Wang and Abdel-Aty, 2006; Bonneson and Zimmerman, 2006), curvature (Savolainen and Tarko, 2005), collision type (Abdel-Aty et al, 2005; Jagannathan et al, 2006), and intersection approach conditions (Poch and Mannering, 1996; Kulmala, 1995; Pickering et al, 1986). In addition, several studies have also examined the influence of these factors on the severity of crashes at intersections (Abdel-Aty and Keller, 2005; Abdel-Aty, 2003; Jagannathan et al, 2006; Riffat & Chin, 2007; Tay & Riffat, 2007; Barua & Tay, 2007).

2.2.3 Studies of Traffic Enforcement at Intersections

Since road intersections are hazardous workplaces for traffic officers, there is an increasing reliance on technology to provide the much needed deterrence to deviant drivers. One of the more widely used technologies for enforcement is the intersection safety camera which serves to deter red light running at signalized intersections (AustRoads, 2004; FHWA, 2005). It should be noted that the effectiveness of intersection safety cameras in reducing crashes, especially side impact or T-bone crashes, has been well established in the literature (Chin, 1989; Ng et al, 1997; Retting et al, 1999a,b,c; Tay, 2000; Synectics, 2003; TRB, 2003; Ruby & Hobeika, 2003; Burkey & Obeng, 2004; Cunningham & Hummer, 2004; Gains A et al, 2004; Council et al, 2005; Garber N et al, 2005; FHWA, 2005). Although there are some concerns among certain segments of the road safety profession that using the intersection safety cameras at certain locations may produce some counter-productive outcomes such as a slight increase in rear end crashes, the overall consensus in the literature suggests a net improvement in safety (Tay & deBarros, 2006).

2.2.4 Studies on Educational Campaigns Targeting Intersection Crashes

Although educational and publicity campaigns have been widely used around the world to change driver behavior, most of these campaigns, especially the high intensity television advertising campaigns, focus on drinking and driving, speeding and not wearing seat-belts. Relatively little attention has been focused on reducing deviant road user behaviors at intersections. Not surprisingly, a search of the published scientific literature did not discover any research articles on the effectiveness of such campaigns. In addition, feedback from several major road safety research centers in Canada, USA, UK, The Netherlands, Australia, New Zealand, Hong Kong and Singapore confirmed that little research had been done in this area.

However, there is also a general consensus that there is much local educational and publicity effort that aims to reduce collisions at intersections. This focus on localized effort is understandable because intersection safety tends to be viewed more as a localized issue. For example, the Insurance Corporation of British Columbia and the Vancouver Police conducted a campaign in 2006 which targeted aggressive driving and intersection collisions (ICBC, 2007). The capital region of the Province of Alberta has also been running such campaigns for several years and their effectiveness has recently been evaluated by Marko et al (2005). The review identified the need to better target the campaigns and utilize theoretical models of behavior change to guide the development of the campaigns in order to increase their effectiveness.

2.3 Demographic Profile

In order to improve the success rate of campaigns, it is important to understand not only the issues involved but also the audience targeted. The primary target of the campaign is road users who are involved in intersection crashes in the capital region. Collision data provided by the City of Edmonton are thus analyzed and the summary of the data are reported in Tables 2.3a & 2.3b shown below. It should be noted that the profiles of drivers involved in intersection crashes are very similar for 2004 and 2005. It is therefore reasonable to assume that these profiles are typical of the profile for recent years. It should also be noted that a single crash may have multiple drivers involved.

Table 2.3 a
2004 Demographic Profile of Drivers (%)

	Under 16	16-25	26-65	Above 65	Total
Male	0.3	15.1	42.0	4.4	61.7
Female	0.1	9.7	26.1	2.3	38.3
Total	0.4	24.8	68.1	6.7	100.0
Note: N = 20,771					

Table 2.3b
2005 Demographic Profile of Drivers (%)

Age	**Under 16**	**16-25**	**26-65**	**Above 65**	**Total**
Male	0.3	15.6	41.2	4.5	61.6
Female	0.1	9.9	26.3	2.2	38.4
Total	0.4	25.5	67.5	6.7	100.0
Note: N = 21,440					

In addition, collision data from the County of Strathcona from 2001 to 2006 are also provided. Of the 7,082 drivers involved in intersection crashes, the age and gender of 6,994 were known. Their distribution is shown in Table 2.3c below. Not surprisingly, the demographic profile of the drivers in Strathcona County is quite similar to the demographic profile of the drivers in the City of Edmonton who are involved in intersection crashes.

Table 2.3c
2005 Demographic Profile of Drivers (%)

Age	**Under 16**	**16-25**	**26-65**	**Above 65**	**Total**
Male	0.2	16.1	36.4	4.0	55.3
Female	0.1	11.3	30.2	1.7	44.7
Total	0.3	27.4	66.6	5.7	100.0
Note: N = 6994					

2.3.1 Gender Effects

In general, male drivers make up a slightly greater proportion (55.3%) of the crash-involved drivers. Interestingly, they are also slightly more represented than females in all age groups. This

higher representation may partly be due to their greater propensity to take risks (Tay, forthcoming; Lewis et al, 2007; Ulfarsson & Mannering, 2004; O'Brien et al, 2004; Williams & Shabanova, 2003; Tay et al, 2003; Tay, 2002; Harre et al, 1996; Mannering, 1993). Boyce and Geller (2002), however, found no significant gender differences in risk taking behavior. An alternative explanation for the crash rates is the higher exposure of male drivers. The distribution between male and female drivers involved in intersection crashes is very similar to other types of crashes in Edmonton and Alberta as a whole (Alberta Transportation, 2006).

2.3.2 Age Effects

The group with the lowest relative involvement rate (less than 0.3%) is drivers who are under the age of 16. They are thus considered as a low priority for campaigns targeting driver behavior. However, it does not imply that children have no important role to play in the campaign. They can be an effective channel or focus to encourage parents to drive more carefully. The group with the second lowest involvement rate is drivers who are 65 years or older. Since most of these drivers are unlikely to be deviant drivers, they are also not a priority for targeted publicity campaigns. Increased training and education of the ageing drivers and parents of children drivers involved in crashes are expected to have a higher efficacy than targeting publicity campaigns to change their behaviors.

The group with the highest share (over two-thirds) of crash involved drivers is the middle-age group or drivers between the ages of 26 and 65. This result is expected because they comprise the majority of the drivers on the roads. In terms of population, this group represents slightly over half of the population in the Edmonton census metropolitan area (Statistic Canada, 2007). Although their crash involvement rate appears to be higher per capita, a large part of it may be due to the higher percentage of the population in this group who are driving. Even though no data for Edmonton and Strathcona are available, the provincial data indicates that this group represents about three-quarters of the driving population in Alberta (Tay, in progress). Assuming that Edmonton and Strathcona are not unique in their age distribution, they may be under-represented with respect to the number of licensed drivers. Regardless, they should be considered as a target group in any road safety campaigns due to their large numbers.

Finally, the group with the second highest share (one quarter) of crash involved drivers is the youths or drivers between the ages of 16 and 24. In terms of population, this group represents slightly over 15% of the population in the Edmonton census metropolitan area (Statistic Canada, 2007). Again, although no data for Edmonton and Strathcona are available, the provincial data indicates that this group represents about 16-17% of the driving population in Alberta (Tay, in progress). It is therefore quite clear that this group is over-represented in crashes per capita and crashes per licensed driver. Therefore, they should definitely be included as the primary target group in any campaign.

2.3.3 Summary of Target Profile

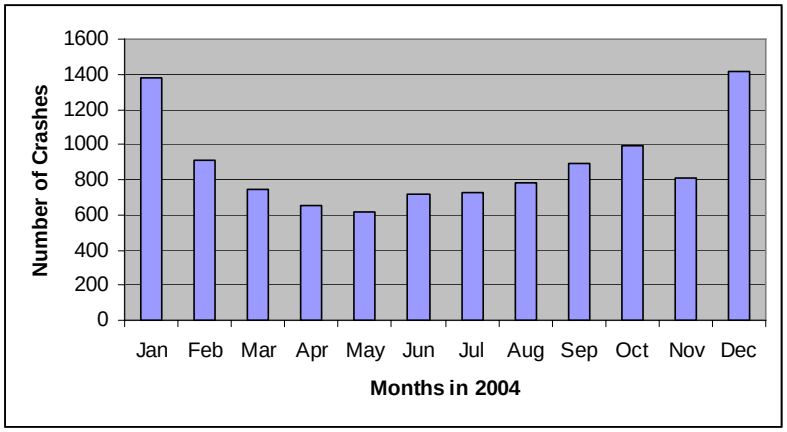
In summary, relatively more male road users are involved in intersection crashes than female road users. Due to their relatively larger proportion in the general and driving population, middle-aged road users comprise the largest group who are involved in intersection crashes and should be considered as a likely target audience in the campaigns. However, if we control for exposure, the youthful road users (16-25 years old) are clearly over-represented in intersection crashes and should be our primary target audience. The most at risk group therefore, is the young male road users between the ages of 16 and 25 years old. However, this group of road users may not be the most amenable to behavior change through campaigns. There is thus a possible trade-off between the degree of risk and the ability to reduce the risk in selecting our target audience.

2.4 Seasonal Effects

2.4.1 Seasonal Effects of Intersection Crashes

It is well known that crashes tend to have a seasonal effect, with relatively more total crashes but fewer fatal crashes occurring in the winter months. To confirm this seasonal effect, the total number of intersection crashes in the City of Edmonton for 2004 and 2005 are tabulated and shown in Figures 2.4.1a. In addition, the data for Strathcona County from 2001 to 2006 have also been summarized and shown in Figure 2.4.1b below.

Figures 2.4.1a
Seasonal Effects of Intersection Crashes in Edmonton



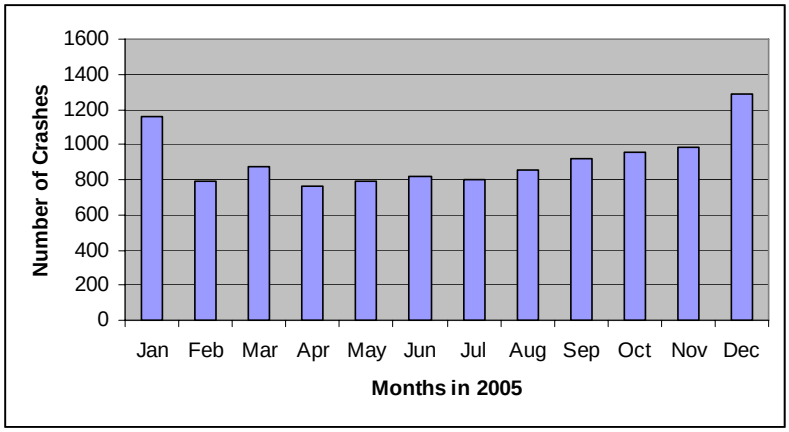
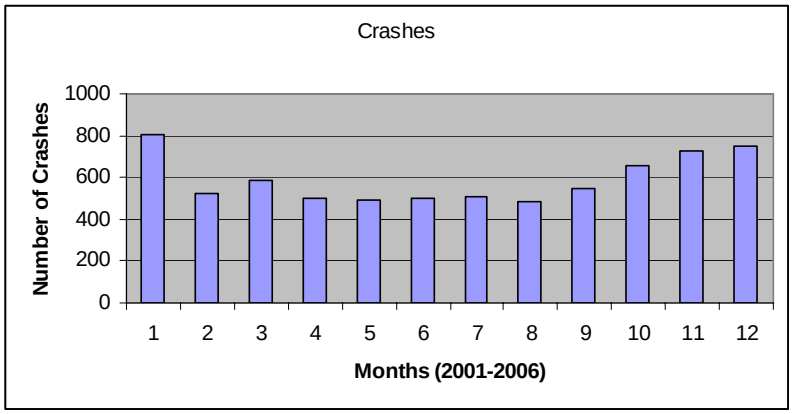


Figure 2.4.1b
Seasonal Effects of Intersection Crashes in Strathcona

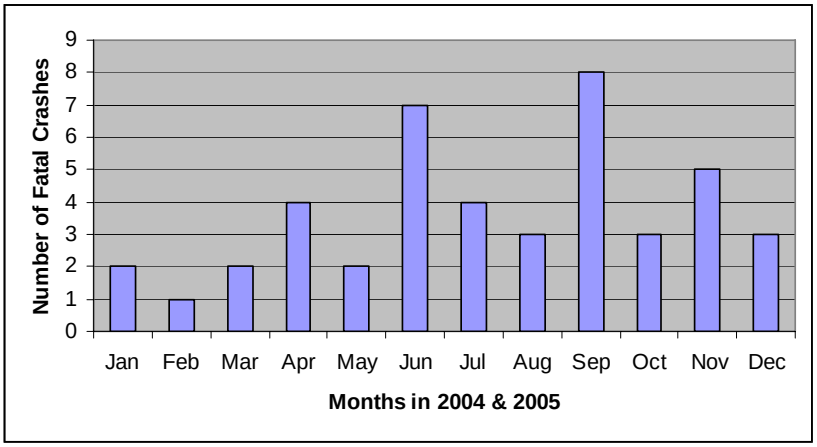


It is clear that the total number of crashes per month has two peaks in the months of December and January in both 2004 and 2005 for the City of Edmonton as well as for the County of Strathcona. These peaks confirm that the number of crashes per month is highest during the winter months.

2.4.2 Seasonal Effects of Fatal Crashes at Intersections

On the other side of the previous hypothesis is that there are more fatal crashes in the summer months than the winter months. Since fatal crashes are very rare events, the number of fatal crashes for both 2004 and 2005 are added and shown in Figure 2.4.2a. Also, data on fatal crashes from the Strathcona County are also summarized and shown in Figure 2.4.2b.

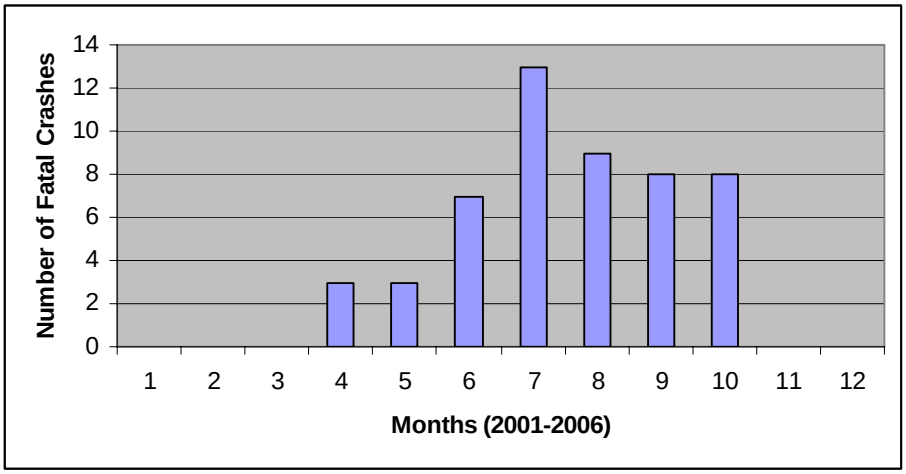
Figure 2.4.2a
Seasonal Effects on Fatal Intersection Crashes in Edmonton



As shown in Figure 2.4.2a, the number of fatal crashes per month has two peaks in June and September, marking the beginning and end of summer. The number of fatal crashes per month is also relatively high in the other summer months. Although not as obvious as total crashes in all locations (Alberta Transportation, 2006), the pattern is still discernable. It should be noted, however, that the number of fatal crashes per month is also relatively high in the months of November and December when the total number of crashes is relatively high as well. This result is not as surprising since the severity of intersection crashes tends to be quite high because a large share of the crashes consists of side-impact crashes or crashes involving pedestrians.

Again, the data from Strathcona County from 2001 to 2006 are also summarized and shown in Figure 2.4.2b. There were 51 fatal intersection crashes of which 13 occurred in the month of July, 9 in August, 8 each occurred in the months of September and October, 7 occurred in the month of June, and 2 each in the months of April and May. These data provide clear support for the second part of our hypothesis that more fatal crashes occur during the summer months and fewer fatal crashes occur in winter months.

Figure 2.4.2b
Seasonal Effects on Fatal Intersection Crashes in Strathcona



2.4.3 Summary of Seasonal Effects on Intersection Crashes

Consistent with the general collision statistics for all crashes in the Province of Alberta, there are more intersection crashes during winter than summer but the severity of crashes tend to be higher in summer; that is, there are more fatal crashes during summer than winter. Education campaigns targeted at reducing the number of intersection crashes (e.g., leaving a sufficient gap to prevent rear end crashes) should be concentrated during the winter months whereas campaigns targeted at reducing the severity of intersection crashes (e.g., reducing speed and stopping red light running) should be concentrated during the summer months.

2.5 Road Users Behavior Factors

2.5.1 Road Users Behavior in Edmonton

In order to better target the campaign, the behavior of road users involved in intersection crashes should be examined. Crash data provided by the City of Edmonton for the years 2004 and 2005 are shown in Table 2.5a below. Since the frequencies are relatively similar between both years, the numbers in Table 2.5a can be assumed to be representative for recent years.

Table 2.5a
Road Users Behavior Factors for Intersection Crashes in Edmonton

Road Users Behavior Factors	**2004**	**2005**	**Total**
Followed too closely	4,649	4,912	9,561
Left-turn-across-path	1,658	1,763	3,421
Failed to observe traffic signal	1,261	1,238	2,499
Stop sign violation	964	946	1,910
Ran off road	430	403	833
Changing lane improperly	358	383	741
Yield sign violation	324	295	616
Improper turn	282	315	597
Failed to yield to pedestrians	156	170	326
Backed unsafely	127	140	267
Failed to yield - no control	95	92	187
Left of centre	53	55	108
Failed to yield to cyclist	37	50	87
Struck parked vehicles	35	46	81
Improper passing	31	43	74
Pedestrian error/violation	24	34	58
Cyclist error/violation	27	25	52
Signed forced turn violation	21	22	43
Others/Unknown	63	61	124
Total	**10,595**	**10,993**	**21,588**

As shown in Table 2.5, the road user behavior that contributes to the largest number of intersection crashes is following-too-closely. This behavior should thus be considered in the education and publicity campaigns due to the sheer number of such incidents. Fortunately,

following-too-closely usually results in rear-end crashes, which tend to be less severe. Safety messages reminding drivers to leave sufficient gaps, such as the 2 seconds rule, can reinforce the protective behavior desired.

On the other hand, the left-turn-across-path action usually results in a side-impact crash or a crash involving pedestrian, which tends to be more severe. Since these crashes are not classified as failure to observe traffic signals, they are more likely to be turning during the permissible green period or at the end of the green light and beginning of the red light. The first improper action is likely to be the result of poor gap selection by the turning vehicle while the second is more likely to be the result of aggressive start movement by the straight-ahead vehicles. Unfortunately, poor gap selection is not a behavior that is amenable to change using safety messages. One possibility is to encourage drivers to be more patient when negotiating an intersection. This message may also be suitable to reduce the aggressive start behavior.

Interestingly, this type of collision, although very common and often deadly, can easily be reduced by restricting turning movements during the normal green light and permitting turning movements only under protected turn periods. This restriction, however, will decrease the efficiency and reduce traffic flow or capacity. In optimizing traffic flow and signal timing, engineers have decided that the benefits from the increase in efficiency outweigh the costs in terms of potential collisions. Similar arguments can also be applied to the installation of stop signs at all non-signalized controls. Perhaps, the education campaign can also target the traffic engineers to change the relative weights of efficiency versus safety.

The other road user behavior of major concern is the failure to observe traffic signals. Since these are signalized intersections, the right of way is usually very clear. Therefore, most of these crashes are a result of red light running behavior by drivers. This improper action is likely to result in side-impact crashes, which tend to be more severe. Due to the high frequency of this action and severity of the crashes involved, this behavior should definitely be targeted in the education and publicity campaigns. As some of these intersections are equipped with intersection safety cameras, the education and publicity campaigns can be designed to complement the automated enforcement.

The next two behaviors with high frequencies of crashes are stop and yield sign violations. Again, since these regulatory signs are quite clear on the right of way, the failure to stop or give way is likely due to aggressive driving or inattention. Like failure to observe traffic signals, these improper actions are likely to result in side-impact crashes, which tend to be more severe. Given the high frequencies of these behaviors and severity of the crashes they cause, these behaviors should definitely be targeted in the education and publicity campaigns. They can either be targeted separately or combined with failure to obey traffic signals as a group that encompasses failure to yield the right of way at intersections.

The next driver behaviors that we may want to keep in mind is the single vehicle run-off-the-road incident due to its relatively high frequency. Single vehicle run-off-road crashes are often associated with excessive speed and alcohol, especially when the road surface condition is dry. A simple and effective way to eliminate this type of crash is the installation of roadside barriers. In terms of education and publicity campaigns, messages targeting excessive speed may have some effect in reducing these types of crashes.

The next two driver behaviors that have a relatively high frequency of occurrence are improper lane changing and turning behaviors. Since these actions are usually undertaken intentionally and reflect poor judgment, simply providing informative safety messages is not likely to have a significant effect on these behaviors. The more appropriate countermeasure is to provide better training and education of drivers. In terms of education and publicity campaigns, one potential strategy is to remind drivers about giving sufficient warning to other drivers by using the turn signals appropriately and to get in the correct lane early. Once again, messages reminding the drives to be patient may also contribute to reducing these crashes

Finally, two other related driver actions that should be targeted are failure to yield to pedestrians and cyclists. Although these actions are not as high as some of the other improper actions, they deserve to be targeted for action because of the vulnerability of pedestrians and cyclists. Crashes involving these vulnerable road users are usually quite severe because they are not well protected. Education and publicity campaigns to remind drivers to look out for these vulnerable road users,

especially when making a right or left turn, and not to drive with excessive speed have the potential to reduce these types of collisions.

2.5.2 Driver Behavior Factors - Strathcona County

Again, the data for Strathcona County are summarized and reported in Table 2.6.1. Note that the driver behaviors reported by the police in Strathcona County may not be exactly the same as those reported by the police in the City of Edmonton. Also, the behaviors of all drivers are included in the summary regardless of fault and there may be multiple drivers in some crashes. It is clear from the table that 'left-turn-across-path and following-too-closely' are also the top two driver behaviors that are alleged to have contributed to intersection crashes, followed by disobeyed traffic signal and improper turn. Stop sign violation and ran-off-road are also relatively frequent. Since the above results are very similar to those obtained for Edmonton, the same interpretations and recommendations are applicable.

Table 2.6.1
Road Users Behavior for Intersection Crashes in Strathcona

Road Users Behavior Factors	**Frequency**
Followed too closely	1032
Left-turn-across-path	777
Disobeyed traffic signal	281
Improper turn	134
Stop sign violation	338
Ran off the road	100
Improper lane change	81
Backed unsafely	61
Failed to yield to pedestrian	35
Left of centre	29
Improper passing	19
Failed to yield at uncontrolled intersection	15
Hit parked vehicle	10
Other	171
Unknown	518
Driving Properly	3444
Total	**7082**

2.5.3 Summary of Road User Behaviors

In terms of road user behavior, left-turn-across-path and following-too-closely are the top two driver behaviors that are alleged to have contributed to intersection crashes, followed by disobeying traffic signal or traffic sign. Ran off the road and improper turning behaviors are also relatively frequent. Educational campaigns should therefore target these behaviors specifically instead of simply asking drivers to be careful or show general threats since specific campaigns tend to be more effective than general campaigns.

2.6 Summary of Campaign Strategies

From the analysis of the driver profile, it appears that there are slightly more male drivers involved in intersection crashes than female drivers. However, this statistic may simply reflect the greater number of male drivers on the roads and not an over-representation in terms of rates or exposure. Similarly, there are more middle-aged drivers involved in intersection crashes than younger or ageing drivers. Again, this statistic reflects the greater exposure of the middle-aged group while the younger and ageing drivers are likely to have higher crash involvement rates per licensed drivers and distance travelled respectively (Tay, 2006; in progress).

If policy makers are interested in simply reducing the number of intersection crashes, then the primary target should be middle-aged drivers and the secondary target should be younger drivers. However, if policy makers are more interested in reducing the collision rates, then younger drivers should be the primary target and middle-aged drivers the secondary target. Another factor to consider with respect to selecting the target audience is the likelihood of success for the campaigns. In general, it is easier to change the risky driving behaviors of middle-aged drivers than younger drivers although some approaches have appeared to be quite successful in general.

In terms of optimizing campaign timing, the evidence revealed that there are more intersection crashes during winter than summer but the severity of crashes tends to be higher in summer; that is, there are more fatal crashes during summer than winter. Education campaigns targeted at reducing the number of intersection crashes (e.g., targeting following-too-closely behavior -

leaving a sufficient gap to prevent rear end crashes) should be concentrated during the winter months whereas campaigns targeted at reducing the severity of intersection crashes (e.g., targeting speed and red light running to reduce left-turn-across-path and ran-off-road crashes) should be concentrated during the summer months.

In terms of driver behaviors, left-turn-cross-path and following-too-closely are the two most important contributing factors and should be the primary target to reduce the number of crashes. However, left-turn-across-path crashes also tend to be more severe, thereby placing them ahead in priority. In addition, crashes involving vulnerable road users like pedestrians and cyclists also tend to be more severe and should be considered as a target group.

3.0 Review of Evidence and Behavioral Theories for Campaign Messages

3.1 Introduction

Public health and safety messages have been used extensively in the last 50 years to promote safe and healthy behaviors by raising awareness of health and safety issues and encouraging the public to change their lifestyles and behaviors. In the road safety arena, public education campaigns have also been widely used in many countries to raise awareness of road safety issues, influence public attitude and change driver behaviors (Beach 1966, Hutchinson et al 1969, Johnston et al 1973, Kohn et al 1982, Fry 1996, Ben-Ari et al 2000; Tay, 2002).

Among the different communications media, television advertising has received the most attention in the research arena because of its high impact and budget. Mass media campaigns in road safety have traditionally relied on donated media and thus experienced limited success. They were frequently aired during undesirable time slots that were not sold and were produced with limited budget and marketing research (Murray et al, 1993; Salmon 1989; Tay, 1999, 2001). More importantly, many of the road safety communications were not designed based on any established behavioral change models (Tay & Watson, 2002b).

However, over the last two decades, there has been an increasing number of paid advertising campaigns in road safety and many of these campaigns have won advertising awards (Lastivicka JL et al, 1987; Bachand, 1988; Cameron et al, 1993; Cameron and Vulcan, 1998). The intensive use of high budget paid road safety advertising campaigns was first adopted by the Transport Accident Commission (TAC) in the Australian state of Victoria at the end of 1989. These "commercials of death," as they are sometimes called, rely on high fear "shock-and-gore" advertising in their attempt to change the attitudes and behaviors of drivers (Chulov, 2002).

Besides some ethical concerns on the use of high fear appeals, these campaigns also generated heated public debates because of the large investment involved (Tay, 1999, 2001a, 2002a, b, c; Tay and Watson, 2002; Tay, 2005a,b,c,d,e). For example, the TAC in Victoria alone invested A$70 million on a variety of road safety campaigns between 1990 and 1995 (Healy and Forsyth,

1996). Similarly, the New Zealand Land Transport Safety Authority (LTSA) adopted a TAC approach in 1995 and reportedly spent over NZ$50 million on similar advertising campaigns through to 1999 (LTSA, 1998).

3.2 Effectiveness of Road Safety Campaigns

3.2.1 Effectiveness in Reducing Crashes

Since its implementation, the Victorian road safety enforcement and advertising campaign has been extensively evaluated (Cameron et al, 1993; Newstead et al, 1995; White et al, 2000; Cameron and Newstead, 2000). Initial evaluations commissioned by the Transport Accident Commission (TAC) and conducted by the Monash University Accident Research Centre (MUARC) concluded that the high levels of enforcement and publicity activities resulted in significant decreases in serious crashes associated with speeding and drink driving (Cameron et al, 1993; Newstead et al, 1995). These positive results formed the basis of the recommendations from MUARC consultants to the transport agencies from other states in Australia, New Zealand and South Africa to embark on similar campaigns (LTSA, 1998; Tay, 1999, 2001a; White et al, 2000; Tay and Watson, 2002).

The results obtained by Cameron et al (1993) and Newstead et al (1995) were subsequently challenged by White et al (2000) who found that the models used in the previous evaluations were not robust and minor changes to the model specification resulted in contrary conclusions. In particular, White et al (2000) concluded that the advertising campaign made no contribution to the reduction of high alcohol hour crashes. Given the seriousness of this issue and the high opportunity cost of the campaigns, it was important that the campaign be re-evaluated in terms of its effectiveness in reaching its goals.

Using the same data from previous studies, Tay (2005b) re-evaluated the effectiveness of the campaigns and tested several model assumptions and specifications. He found that the campaigns were effective in reducing serious crashes during high alcohol hours and showed that the results obtained were robust with respect to reasonable changes in model specifications. In

addition to the Australian campaign, the same evaluation results were also obtained for similar campaigns conducted in New Zealand. Tay (1999) found that the New Zealand advertising campaign was effective in reducing drinking and driving collisions. This result was also robust with respect to several changes in model specifications (Tay, 2001).

In a meta-analysis conducted by the U.S. Center for Disease Control, Elder et al (2004) attempted to answer the question: "Do mass media campaigns result in reduced drunk-driving and alcohol related crashes?" The eight studies surveyed by the authors had to satisfy several rigorous criteria to be included and were conducted in several countries including New Zealand, Australia and the USA. The authors concluded that mass media campaigns on drink driving significantly reduced alcohol-related crashes in the period during or after the campaign. The median decrease in alcohol-related crashes resulting from the campaigns was 13% (inter-quartile range: 6% to 14%). Economic analyses of campaign effects indicated that the societal benefits were greater than the costs.

Elvik and Vaa (2004) conducted a meta-analysis of the effectiveness of road user information campaigns in reducing crashes and the results of their meta-analysis is shown in Table 3.2.1 below. They concluded that campaigns targeted at road accidents in general had not led to statistically significant changes in the number of accidents but more targeted campaigns like seatbelt and drink driving campaigns had a better success rate.

Table 3.2.1
Effects on Accidents of Road User Information and Campaign

		Percentage change in the number of accidents	
Type of information campaign	Type of accident affected	Best estimate	95% confidence interval
General campaigns	All accidents	0	(-3; +3)
Pedestrian campaigns	Pedestrian accidents	+ 3	(-2; +8)
Driving off the road campaigns	Driving off the road accidents	- 3	(-16; +11)
Keep your distance campaigns	Rear-end collisions	- 9	(-17; +1)
Safety belts campaigns	Injuries to car occupants	- 23	(-31; -13)
Drink-driving campaigns	Drink-driving accidents	- 49	(-60; -35)

Source: Elvik and Vaa (2004)

3.2.2 Independent Effect or Supportive Role

In one of the few studies that explicitly examined the relationship between public education and law enforcement campaigns, Cameron et al (2003) concluded that there was no evidence of an interaction between the effects of speed camera ticketing and speed-related publicity awareness on the frequency of casualty crashes in the Australian State of Victoria. The effect of speed related publicity during 1996-2000 was due to advertising with emotive styles. The authors therefore questioned strategic principles suggesting that speed camera enforcement and speed-related mass media publicity should operate together to produce maximum effect.

In another study, Tay (2004) correlated the traffic collision data from New Zealand with the corresponding traffic enforcement and advertising data and found that the publicity campaign was effective in reducing speed-related serious crashes. Moreover, he also found that enforcement and publicity had separate and independent effects in reducing crashes but the interaction effect was anti-complementary implying that it reduced their overall effectiveness.

In a recent study that re-evaluated the effectiveness of anti-drink-driving and anti-speeding enforcement and publicity campaigns implemented in the Australian state of Victoria, Tay (2005a) showed that the anti-drink-driving enforcement and publicity campaigns had significant independent effects in reducing crashes involving young male drivers but their interactive effect was anti-complementary. Conversely, the anti-speeding enforcement and publicity campaigns had no independent effect but their interactive effect was significant in reducing crashes involving young male drivers. The latter is in contrast to the earlier study by Cameron et al (2003) due to the different target audience examined.

Therefore, the relationship between enforcement and educational campaigns is not as clear as commonly believed and depends largely on the road users and behaviors targeted, theoretical approaches used to design the campaigns, and drivers' response to these campaigns. The widely held belief that educational campaigns work best when combined with enforcement is therefore not supported by evidence. Most of the practitioners who arrived at this misconception largely based their opinions on simple comparisons of campaigns with and without the support of

enforcement, without any rigorous analysis to separate the independent effects from the interactive effects.

As argued by Tay (2005a), the anti-drink driving enforcement and publicity campaigns had independent effects and can be performed separately because of several factors. The crash risks associated with drinking and driving are clear and widely accepted by the public. Thus, the campaigns act more as cues to prompt behavior change. The emotive style of advertising also helps to motivate those who are contemplating to change their behavior. In addition, the linkage between drink driving and crash risks can be clearly portrayed in the advertisement. More importantly, there are many strategies to cope with the dangers of drink driving including taking public transportation, having a designated driver, taking a taxi, etc. These strategies can be shown in the advertisements to increase their effectiveness. Therefore, the advertisements by themselves have a high likelihood of success because they can clearly show the likelihood and severity of the crash risks associated with drink driving as well as portray the benefits of the recommended preventive actions.

With respect to drink driving enforcement, since the crash risks associated with drinking and driving are clear and widely accepted, there is little resistance or resentment to enforcement targeting drinking and driving. Moreover, since the level of enforcement is very high (equivalent of one test per licensed driver per year - more than 2 million breath tests was performed in one state or province every year) and the random breath testing operations are highly visible, they generate quite a lot of general deterrence by themselves. Therefore, there is less need for publicity campaigns to supplement the enforcement efforts. Hence, adding publicity campaigns to the enforcement campaigns increases the effectiveness of the enforcement campaigns but not to the extent expected from the resources invested.

On the other hand, Tay (2005a) found that anti-speeding advertising and enforcement campaigns had significant complementary effects and should be performed together. Tay (2005a) argued that the need for conducting publicity and enforcement campaigns together arises due to several factors. The link between speeding and crash risks is not as clear and widely accepted by the public. Many motorists still think that the purpose of speed enforcement is to raise revenue and

not to improve safety. Hence, enforcement campaigns need to be supported by publicity campaigns that emphasize the link between speeding and crash risks. The public education campaigns play an important role to change public perception of enforcement in addition to attempting to change driver behavior.

With respect to the behaviors targeted in intersection safety, left-turn-across-path collisions are not easy to address using enforcement although more police presence may reduce the traffic speed and thus reduce the likelihood and severity of this type of crash. Hence, efforts to reduce left-turn-across-path collisions should rely more on education campaigns than enforcement campaigns. On the other hand, behaviors like red light running can be targeted using enforcement and the link between red light running and crash risk is quite clear and widely accepted by the public. Hence, red light running enforcement and education campaigns can be done independently because there is less need to do them both concurrently. Finally, behaviors like speeding and following-too-closely may need both enforcement and education campaigns to be performed concurrently.

3.2.3 Effectiveness in Changing Driver Behaviors

Even though cumulatively, they are a serious safety problem and extract a high cost on society, crashes are still rare events. To ensure a sufficiently large sample in order to perform reliable statistical analyses, evaluations have to be done at a highly aggregated level and across an extended time period. Outcome evaluations, therefore, can require significant time and resources. Moreover, controlling for confounding and moderating factors can be quite difficult. Not surprisingly, few campaigns have been properly evaluated in terms of their effectiveness in reducing crashes, despite over fifty years of practice (Berkowitz & Cottingham 1960; Beach 1966; Farmer, 1974; Griffeth & Rogers, 1976; Grunig & Ipes, 1983; Atkins, 1989; Murray et al, 1993; Koenig & Wu, 1994; Leslie & Rooney, 1996; Tay, 2001, 2005; Ebel et al, 2003).

Since most education and publicity campaigns target specific risky behavior, a reasonable alternative is to evaluate the impact of these campaigns on driver behavior. However, measuring and quantifying on-road behavior is not simple either, which is why most studies rely on

evaluating driver behavior using a driving simulator (Griffeth & Rogers, 1976). Although the driving simulator is a useful tool to study driver performance, it is not very appropriate for studying driver behavior since it lacks ecological validity (Evans, 2004). In one of the few studies that examined the effect of safety messages on on-road driver behavior, Tay & deBarros (2006b) found that anti-speeding messages displayed on permanently installed variable message signs have a low to moderate effect on traffic speed on Highway 2 between the cities of Edmonton and Calgary in Canada.

3.2.4 Efficacy in Changing Attitudes, Intentions and Self-Reported Behaviors

In addition to evaluating its effectiveness in reducing crashes and changing behavior, another common approach used in road safety communications research is to evaluate the efficacy of the communications in changing road users' attitudes, intentions and self-reported behaviors (Beach, 1966; Tay & Watson, 2002; Griffeth & Rogers, 1976; Tay et al, 2004; Leslie & Rooney, 1996; Tay & deBarros, 2006b; Harre et al, 1996; Tay, 2002; Lewis et al, 2003, 2007b). In general, the research literature appears to support the efficacy of road safety communications in changing drivers' attitudes, intentions and self-reported behaviors. Since these measures are one-step away from the final desired outcome (prevention and reduction of crashes), a conceptual model is needed to provide the theoretical foundation linking the campaign to the desired outcome. Moreover, these studies often include measurements of the different key constructs and components of the messages and audience responses to the message. Therefore, they provide a very useful foundation to understand how and why the campaign works or not.

Elliot (1993) conducted a review of several Australian campaigns and a summary of his findings is shown in Table 3.2.4 below. Of the studies reviewed, 40 focused on seatbelt usage, 15 on drinking and driving and 10 on speeding. Overall, these campaigns seem to be effective in self-reported behavior and these effects appear to be stronger than the corresponding effects on the number of crashes.

Table 3.2.4
Effects of Road User Information and Campaigns on Behavior

Type of Behaviour	Measure of effect	Before the campaign	After the campaign	Uncertainty in the after-figures (95%)
Use of safety belts	Number of users (%)	61.6	73.7	(73.3; 74.0)
Drink-driving	Percentage of drink-driving (%)	29.8	24.2	(23.3; 25.3)
Speeding	Number of violations (%)	50.5	40.1	(39.6; 40.3)
Use of cycle helmet	Number of users (%)	12.4	19.8	(18.2; 21.5)

Source: Elliot (1993), reproduced from Elvik & Vaa (2004)

3.2.4 Advertisement Recall and Awareness

One commonly used approach by advertising practitioners to evaluate the effectiveness of an advertising campaign is to gauge the ability of the audience to remember the advertisement, either aided or unaided. Although this approach is useful in establishing brand image, it is not a good performance measure for safety. Awareness and recall of the advertisement does not imply that the subjects will change their attitudes, intentions or behaviors. More importantly, there is no evidence that advertisement recall is even correlated with a change in drivers' attitudes, intentions or behaviors, much less crash outcomes.

3.3 Theoretical Models of Behavior Change

3.3.1 Introduction to Relevant Behavior Change Models

One of the problems with many road safety publicity campaigns is that they are not designed using any theoretical model of behavioral change. Also, many earlier evaluations of road safety campaigns did not utilize any conceptual framework in their evaluations. Without a firm theoretical framework, the validity and reliability of the key constructs and performance indicators used are difficult to assess. With the introduction of some theoretical models in more recent studies, subsequent evaluations were able to provide a clearer overview of both the process involved and outcome expected of these campaigns. Intermediate outcome indicators

such as attitudes, perceptions and intentions can be monitored to provide a better understanding of the behavioral change process.

There are many theoretical models of behavioral change that can be applied to develop and/or analyze road safety messages, including but not limited to:

- Functional Theory of Behavior
- Theory of Reasoned Action
- Theory of Planned Behavior
- Elaboration Likelihood Model
- Health Belief Model
- Social Cognitive Theory
- Social Marketing of Health
- Persuasive Communication
- Terror Management Theory
- Fear Drive Model
- Protection Motivation Model
- Parallel Response Model
- Extended Parallel Process Model
- Utility Maximization Theory in Economics

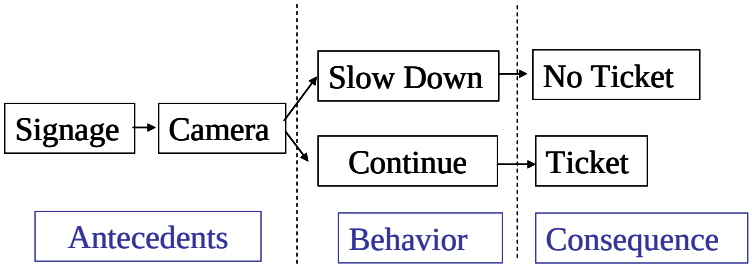
A summary of some of the major models and synthesis of the keys concepts can be found in Witte & Allen (2000), Fishbein (2003), Bandura (2004) and Lewis et al (2007a,c). Some of the models like The Theory of Planned Behavior and Social Marketing of Health aim to raise awareness in order to change the attitudes and social norms that affect the person's intention to undertake healthy and safe behavior. These models rely relatively more on the rational approach to motivate behavioral change whereas models like Fear Drive, Protection Motivation or Parallel Response rely relatively more on emotional appeals to drive behavioral change. One added advantage of affective models is the fact that they rely on emotional appeal and are thus expected to have a immediate motivational effect or drive to change and thus a more direct impact on the audience – as opposed to changing drivers' attitudes and social norms, which is expected to be a much longer term goal.

Note that the number of theoretical models that can be used is fairly large and in-depth descriptions of the various models are beyond the scope of this study. Therefore, only a brief overview of selected models that are more widely used will be presented. Note that many of these models have overlapping components and share very similar approaches, particularly the rational approaches to driver choice and decision making. Similarly, many of these approaches that rely on threatening messages also share common constructs and components.

3.3.2 Functional Theory of Behavior

One of the most basic models of behavior is the Functional Theory of Behavior, which is sometimes known as the ABC model. The key components of the model are shown in Figure 3.2.2 below.

Figure 3.2.2
Functional Theory of Behavior



The model has three basic propositions:

- Behavior is controlled (motivated) by its consequences.
- Antecedent events signal the particular relationship between a response and its consequences.
- Behavior can therefore be controlled by its antecedents.

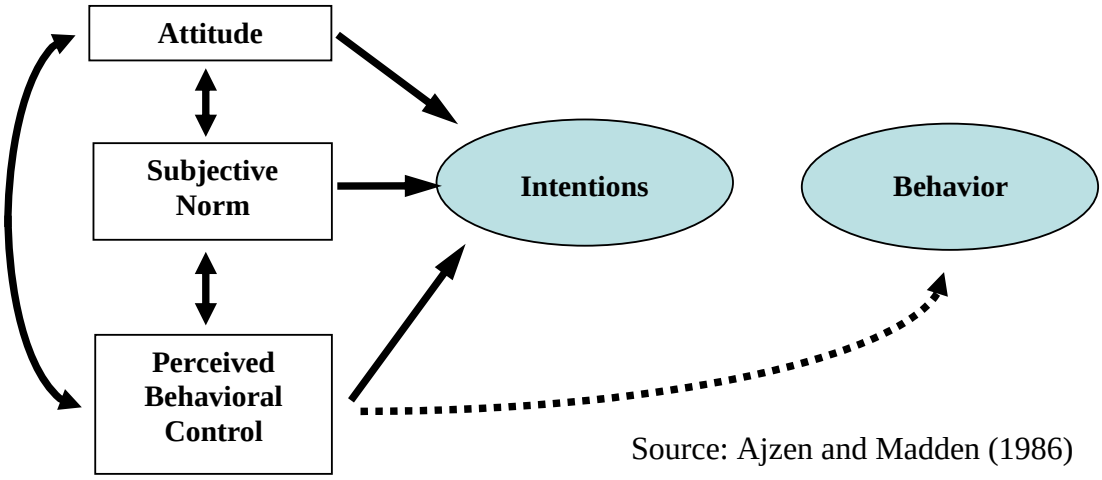
Although not explicitly used in developing traffic signs, this model can be used to explain the efficacy of providing traffic information to drivers. In particular, this model can be quite useful in developing signage to reduce the incidence of red light running at intersections by cueing the

drivers to the adverse consequence of punishment or preventing pedestrian collisions at crosswalks by cueing the drivers to the adverse consequence of hitting a pedestrian. The same model can also be used to cue drivers by using a billboard displayed along the road instead of the traditional traffic signs. Safety messages emphasizing the negative consequences of risky behaviors, such as red light running or failure to stop, may cue drivers to drive more carefully at intersections.

3.3.3 Theory of Reasoned Action and Theory of Planned Behavior

One of the most widely used theoretical models in social psychology to understand and change driver behavior is the Theory of Planned Behavior and its predecessor, the Theory of Reasoned Action. Since the Theory of Reasoned Action is a subset of the Theory of Planned Behavior, but without the Perceived Behavioral Control construct, it will be subsumed in the Theory of Planned Behavior (TPB) in this discussion. Figure 3.3.3 shows the key components in the Theory of Planned Behavior.

Figure 3.3.3
Theory of Planned Behavior



Source: Ajzen and Madden (1986)

- The attitude component includes beliefs and evaluations about the consequences of a particular behaviour.
- Subjective norms include beliefs about significant others' attitudes toward the behaviour.

- Perceived behavioural control relates to a person's perceived ability to perform the behaviour.
- These three elements are assumed to affect a person's intention, which in turn will affect his or her behaviour.
- Behaviour is also directly affected by a person's perceived behavioural control because if behavioural control is weak, the subject may behave contrary to his or her intentions.

The model has been used successfully to predict a wide variety of road user behaviour (Rothengatter & Vaya, 1997; Gordon and Hunt, 1998; Tay et al, 2002b). For example, Parker et al (1992) found that it can explain the following traffic violations:

- drink driving (42%)
- following-too-closely (27%)
- dangerous overtaking (34%)
- speeding (47%)

Although TPB is developed to explain social behavior, like speeding and drink driving, it can be modified to explain fleet safety management behavior as well. For example, Newnam & Tay (2007) used it to explain fleet managers' lack of concern for fleet safety in the public sector in Queensland, Australia. In addition to explaining driver behavior, TPB can also be used to design countermeasures targeting road users. According to this theory, in order to change driver behavior, we must change the driver's attitude, the beliefs of people who are important to the driver, or change the driver's perceived control of the behavior. Therefore, when designing educational and publicity campaigns, we have to be clear about which of these key components are being targeted. Unfortunately, the model does not provide sufficient information on how these components can be effectively targeted or changed.

3.3.4 Persuasive Communications and Elaboration Likelihood Model

Persuasion is believed to occur when the receivers take an active role in the changing of their own attitudes, beliefs and behaviour (Bettinghaus & Cody, 1994). According to the Elaboration Likelihood Model (ELM), this attitude change can occur through two routes of persuasion (Petty et al, 1981; Newnam & Tay, 2007):

- Central Route: evaluation of the intrinsic relevance of the argument - message characteristics such as message comprehension, order of arguments, use of logic, etc, are keys to success

- Peripheral Route: evaluation of the extrinsic qualities of the argument - source characteristics such as trustworthiness, level of expertise, likeability, and similarity have a strong impact on message acceptance

To be persuasive, any road safety message should therefore be very clear about the behaviour being targeted. In this regard, targeting specific behaviour like not following-too-closely or leaving a two seconds gap is more persuasive than targeting general safe driving behaviours or simply raising awareness of road safety issues. The arguments presented must be logical, credible and convincing, which implies that simply stating that speeding causes crashes is not likely to work with unconverted drivers or non-believers. Again, the message has to be more specific in showing why and how driving even a few km/hr above the speed limit can result in crashes. The problem with many road safety messages is that they tend to show extreme behaviours, which are often discounted by the viewers.

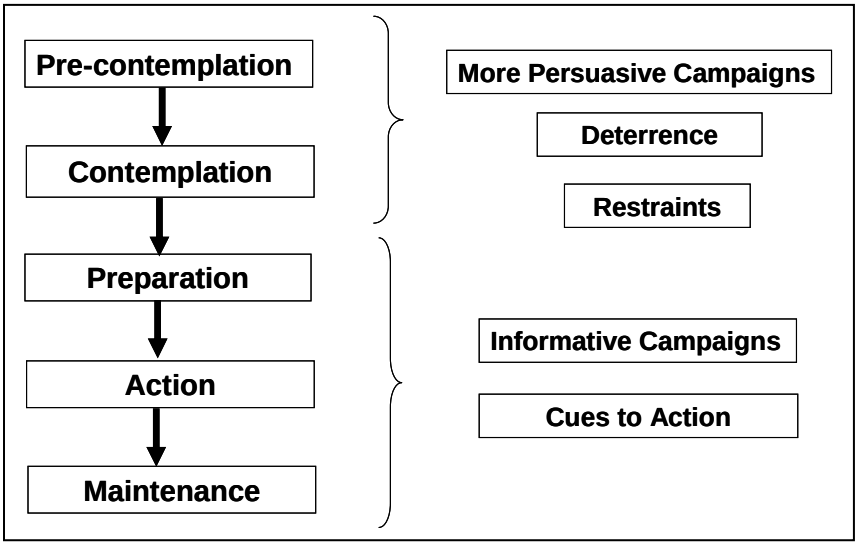
The credibility of the message can also be enhanced by using an appropriate spokesperson. While the use of law enforcement officers may be suitable for law abiding and older drivers, many risk taking drivers perceive them as not credible due to a perceived conflict of interests (revenue raising concerns). Victim testimonies may be useful, although there is a possibility that some drivers may discount them because of optimism bias or the belief that they are better drivers than the victims. Victim testimonies are powerful to illustrate the threat associated with killing or hurting someone else and may be suitable for drivers who feel "invincible" or not vulnerable to the dangers associated with risky driving. Other credible sources include fire and rescue, researchers and emergency medical personnel.

3.3.5 Trans-Theoretical Model of Change & Persuasive Communications

The central route has been found to produce a more enduring change and a better predictor of behaviour change than the peripheral route. However, the latter finding is more likely to be true where a rational decision making framework is assumed or for drivers who realize that they have a problem and are at least contemplating making changes. These drivers can be considered to be

people in the second stage or higher in the 5-stage model of change or the Trans-theoretical model of change shown in Figure 3.3.5 below.

Figure 3.3.5
Trans-Theoretical Model of Change & Persuasion

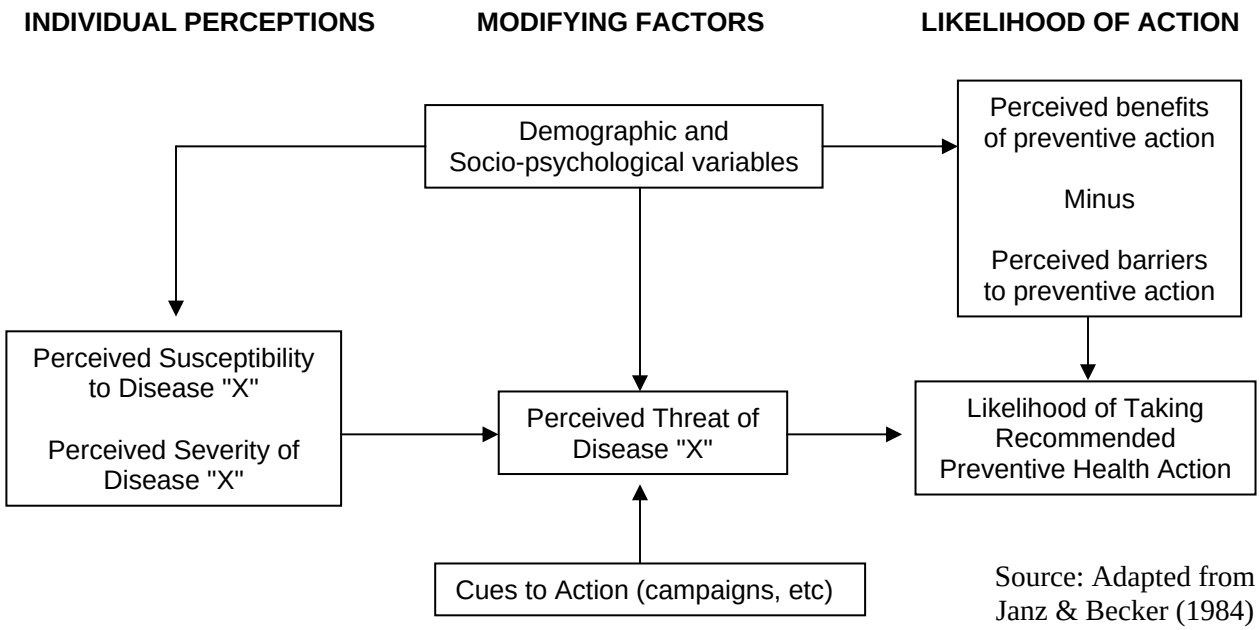


For many risky driving behaviours and risky drivers, a rational approach may not be enough to induce drivers to change their behaviours. This hypothesis is especially relevant to drivers who are in the pre-contemplation stage, which includes drivers who do not think that they have a problem and who are not thinking about changing their behaviours. For these drivers, simply providing information and raising awareness of the issue does not have an effect and a stronger approach such as fear appeals may be needed.

3.3.6 Health Belief Model

One of the most widely used models in health promotion and health campaigns is the Health Belief Model shown in Figure 3.3.6 below.

Figure 3.3.6
Health Belief Model



Source: Adapted from Janz & Becker (1984)

In this model, the likelihood of the subject taking the recommended preventive health action is assumed to be dependent on the perceived benefits of taking the preventive action minus the perceived barriers to taking the prevention action. In effect, this assumption is similar to the economic theory of consumer choice or utility maximization theory discussed in section 3.3.10. This net benefit of the preventive action is then weighed against the perceived threat of not taking preventive action or the perceived cost of not taking the preventive action. The perceived cost of not taking action is in turn derived from the perceived susceptibility or the likelihood of a crash and the severity of the crash. Educational and publicity campaigns, therefore, should aim to increase this perceived threat. According to this model, road safety campaigns should therefore highlight the likelihood and severity of a crash.

3.3.7 Fear Appeals in Health & Safety Messages

Not surprisingly, many road safety campaigns tend to rely on affective models of behavioral change. For example, both the Australian and New Zealand advertising campaigns utilized fear

appeal as the basis of persuasion (Macpherson and Lewis, 1998; Rotfeld, 1999; Tay, 1999). The use of fear appeal in promoting public health is not new. It has been used in many areas including dental hygiene, smoking, energy crisis, crime, mumps, sexually transmitted diseases and AIDS (see Tay, 1999 for references to these areas). The conventional belief in fear appeals research is that the fear for one's health and safety is the primary motivation for adopting health and safety behaviors and thus the higher the level of fear, the more motivated the subjects are to change their behavior.

A number of such studies have focused on the impact of fear-based advertising campaigns targeted at reducing unsafe driving behavior and fatal accidents caused by driving after drinking alcohol, and driving while fatigued and speeding. The conceptual framework underlying fear appeal has been well discussed in the literature (Shimp, 1997; Latour and Zahra, 1988; Ray and Wilkie, 1970; Tay, 1999). In its simplest form, the process consists of three steps (Latour and Zahra, 1988). The first step involves the creation of a fearful situation designed to activate a person's sense of risk and vulnerability. In the road safety arena, such situations arise from drink-driving behavior, non-usage of seat belts and speeding.

In the second stage of employing the fear appeal, the danger is depicted to be serious enough to warrant attention. For example, in the New Zealand Drink-Driving Advertising Campaign, this danger is often depicted by a bloody crash scene. In one of the advertisements, several teenagers were drinking and driving when their car skidded off the road and down an incline. The driver managed to get out of the car in time to witness his friends being burned to death while trapped in the overturned car.

In the third phase, a solution is provided as a means of fear reduction. In the New Zealand Drink-Driving Advertising Campaign, this fear reduction is achieved by urging drivers not to drink and drive. In these advertisements, the negative consequences of not accepting the warnings issued are highlighted to stimulate the desired response from the audience. Thus, the most common punch-line used in the advertisements is "if you drink and drive, you are a bloody idiot." It should be noted that simply asking drivers not to do something they desire is not providing the audience with a good or feasible solution.

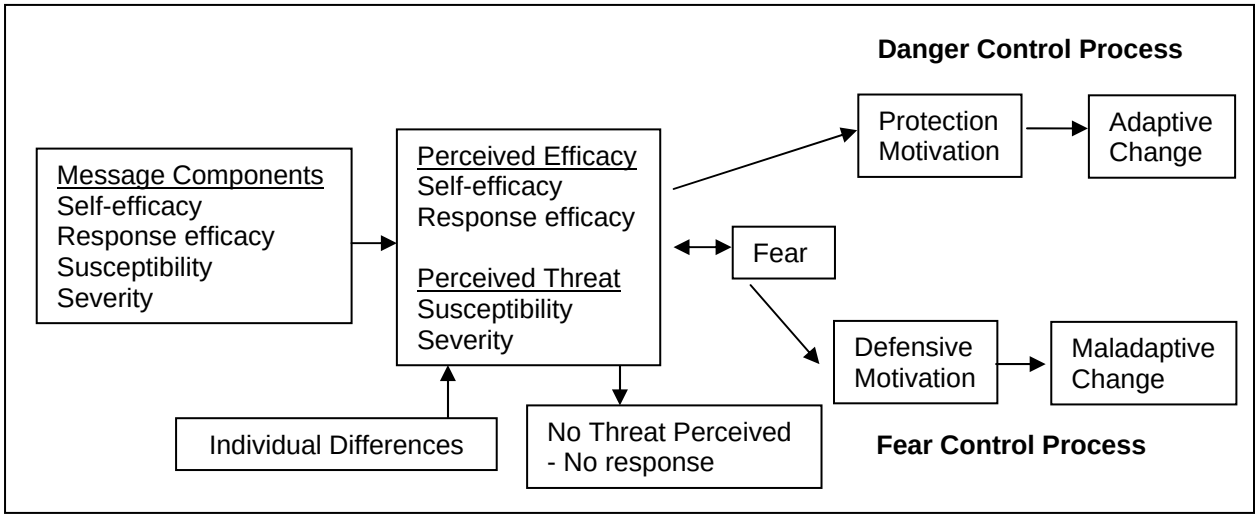
Despite over fifty years of research in fear appeals, an unequivocal answer to its effectiveness cannot be reached. The focus of much of the recent research, therefore, has shifted to determining the conditions and circumstances that increase the likelihood of success of fear appeal models, hence extending the traditional fear drive model.

3.3.8 Extended Parallel Process Model

Many theoretical models have been developed that utilize fear as an appeal or motivation to behavior change including the protection motivation model, parallel response model and the extended parallel process model. The most comprehensive model of fear appeal to date is the Extended Parallel Process Model (EPPM) developed by Witte (1992) and shown in Figure 3.3.8 below. Since EPPM encompasses most of the constructs from earlier models, only the EPPM will be discussed in this study.

The key constructs in this model are fear (driving force or motivation for change), response efficacy (coping strategies shown) and self-efficacy (perceived personal control over behavior). Essentially, the model hypothesizes that if the level of fear arousal and message efficacy are both high, then the subject will engage in adaptive behavior (adopt recommended behavior) to deal with the health threat portrayed; whereas, if the level of fear is high but the message efficacy is low, then the subject will engage in maladaptive behavior (defensive avoidance mechanisms) to reduce the fear.

Figure 3.3.8
Extended Parallel Process Model



Source: Adapted from Witte (1992)

The essential thing to note is that this model clearly outlines the external and message components that are critical to the success of the safety message: Self Efficacy, Response Efficacy and Threat. An effective message should clearly portray the severity of threat and/or the susceptability of the audience to the danger and provide simple coping strategies that the audience is able and willing to adopt. Hence, this model can also be considered as an extension of the Health Belief Model. The main difference is that in the EPPM, the message encompasses both the threat and preventive actions instead of just the threat in the Health Belief Model.

The EPPM has been successfully used to analyze several road safety campaigns in recent years (Tay & Watson, 2002; Tay et al, 2004; Tay, 2005; Tay & deBarros, 2006b). Tay and Watson (2002) and Tay et al (2004) argued that although the level of fear arousal was positively correlated with positive driver intentions, its impact was smaller than other characteristics such as response efficacy and self-efficacy. Also, the higher the level of fear arousal, the more likely it is that the viewer will invoke defensive avoidance behavior, resulting in maladaptive behaviors. So, policy makers and advertisers should focus more on providing the viewers with ample strategies to cope with the threat rather than simply increasing the threat level or fear arousal in

the advertisements. This result also suggests that the EPPM is more suitable than the Health Belief Model since it includes response efficacy as a key component of the message.

3.3.9 Social Marketing

In social marketing, widely accepted marketing techniques are used to analyze, plan, execute and evaluate programs designed to influence behavior for the benefit of the individual and the society. According to Kotler et al (2002), social marketing involves four essential steps:

1. Where are we?
   - Determine program focus
   - Identify campaign purpose
   - Conduct SWOT analysis (strength, weakness, opportunity, threat)
   - Review past and similar efforts

2. Where do we want to go?
   - Identify target audience
   - Set objectives
   - Analyze competition and target audience

3. How will we get there using the four Ps of Marketing:
   - **Product:** Behavior to be marketed must be attractive to target audience
   - **Price:** Benefits of behavior must exceed its costs
   - **Place:** Behavior must be easy to do; Support available & accessible
   - **Promotion:** Message created and delivered in the most effective way

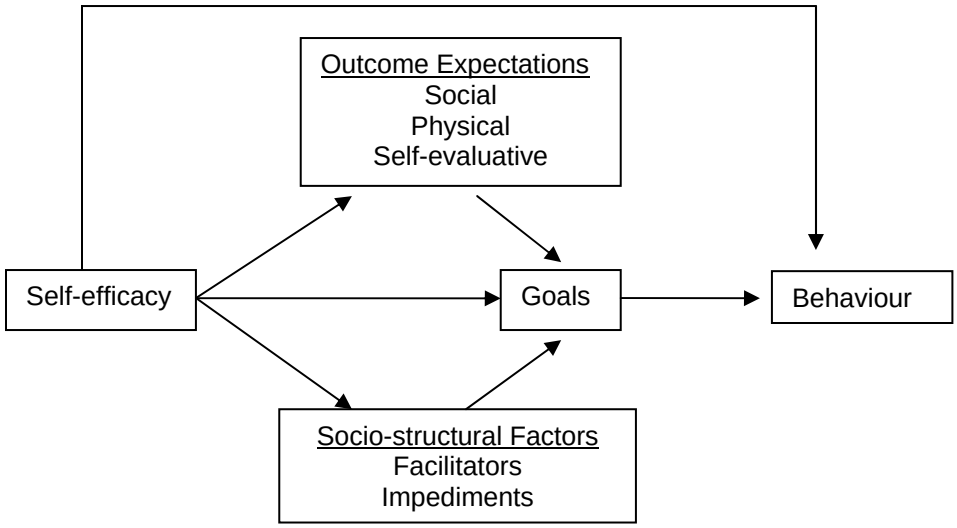
4. How will we stay the course?
   - Plan for evaluation and monitoring
   - Establish budgets and find funding sources
   - Complete an implementation plan

The framework outlined above provides a more macro-level process to marketing road safety but provides few concrete constructs, although there are some indirect points given under the four Ps. Also, in contrast to the Health Belief Model, it focuses more on the preventive actions rather than the highlighting of the threat. It is important to note that the idea is to sell safety and the focus of the campaign has to be on the benefits of driving safely and creating a demand for safety. Trying to "unsell" risky behaviors is much harder than trying to sell something the drivers want.

3.3.9 Social Cognitive Theory

According to Bandura (2004), social cognitive approaches focus on reducing the demand for medical services by promoting effective self-management of health habits that keep people healthy throughout their life span. Social Cognitive Theory specifies a core set of determinants, the mechanism through which they work, and the optimal ways of translating this knowledge into effective health practices. The core components of the theory are shown in Figure 3.3.9 below:

Figure 3.3.9
Social Cognitive Theory



- Perceived self efficacy: one can exercise control over one's health habits
- Outcome expectations: expected costs and benefits for different health habits

- Goals: goals that people set for themselves
- Social Structural Factors: perceived facilitators and impediments to change

Bandura (2004) argues that self efficacy is the focal determinant because it affects health behavior, both directly and indirectly, by its influence on the other determinants. Using this model would then require us to target the health message at increasing the self-efficacy of the target audience to adopt a safer driving style.

3.3.10 Economic Theory of Decision Making Under Uncertainty

Economics is the social science that focuses on the optimal allocation of scarce resources. The central question that economists attempt to resolve is how best to utilize the resources we have to maximize our returns. The resources we have include our time, effort, money and other monetary resources. The returns can also be monetary or non-monetary in nature, such as level of safety, and are usually summarized by a utility function with specific properties. In addition, our choices may also be restricted by physical, social or legal constraints. The general result or optimal rule of economic decision making is that resources should continue to be invested until the returns from an additional unit of resource invested are equal to its returns. In cases where the outcome is uncertain, then the rule is simply generalized to account for the probabilities of the different outcomes occurring and the expected costs and benefits (probability x value of outcome) are used instead.

Peltzman (1975) and Blomquist (1986) developed the utility maximization model for the case of the demand for road safety to analyze the amount of driving effort a driver would invest in and how the effort varies with the external environment. The amount of effort and thus level of safety that a driver chooses will depend on the expected marginal costs and benefits of investing in the extra effort required. Therefore, to increase the driver's effort, we need to increase the perceived benefits of taking the preventive actions or safe driving behavior and/or increase the perceived costs associated with not making the extra effort or taking the preventive actions. The role of road safety advertising campaigns is therefore to change these perceptions.

Although the economic theory of decision making under uncertainty does not prescribe any guidelines on the creative process, it does provide a clear objective for the message and an intermediate outcome that can be used to evaluate the potential success of the investment in the publicity campaign. It also speaks to the need to focus on the central route of persuasion under the elaboration likelihood model that the logic of the arguments should be very strong and the consequences of driving safely or unsafely must be made very clear to the viewers in order to persuade them to accept the message and change their behaviors.

3.4 Misconceptions about Road Safety Campaigns

There are many widely held misconceptions in the field of road safety campaigns that are not supported by theory or evidence and some are highlighted below:

- Advertising campaigns are effective only when used with other countermeasures, like enforcement.
- Campaigns can only raise awareness but not change behavior.
- Effectiveness of campaigns cannot be evaluated.
- Advertisement recall is a good indicator of success.
- The higher the level of fear, the more effective the advertisement.
- A focus group is the best way to design a campaign.

3.5 Summary

Regardless of the behavior change model used to develop the actual message, the overall approach outlined in Kotler's social marketing theory should be used to plan, execute and evaluate any publicity campaign. The design of the message itself should rely on at least one of the behavioral change models or utilize a combination of the various models to ensure that the key components of a successful message to change road user behaviors are present. In general, most of the theoretical models target two things to varying degrees: threat associated with the risky behavior and the benefits associated with adopting the safe driving behavior.

These constructs have to be clearly perceived by the audience as they form the central route of persuasion, which is the basic logical or rational motivation for change. The behavior targeted should be very specific and clearly illustrated in the message and the logic and arguments (actions and consequences) shown have to realistic and convincing. In addition to the central route, the peripheral route of persuasive communications stresses the need for the message to be delivered in a credible manner and the use of an independent and trustworthy source will enhance the likelihood of message of acceptance. The use of emotion, such as fear, shame or guilt, to increase the drive for behavior should also be considered

4.0 Best Practices and Effective Campaigns

4.1 Introduction

Although road safety messages have been used extensively in the last 50 years to promote safe driving behaviors by raising awareness of the safety issues and encouraging drivers to change their behaviors, few campaigns are adequately evaluated in terms of conceptual, process and outcome evaluations. (Beach 1966, Hutchinson et al 1969, Johnston et al 1973, Kohn et al 1982, Fry 1996, Ben-Ari et al 2000; Tay, 2002). Therefore, it is not surprising that few campaigns have publicly available documentations on their conceptual designs, implementation processes and outcome evaluations. Moreover, most of these campaigns utilize the mass media, especially television advertisements, because they have relatively large budgets. Nevertheless, a few examples of effective campaigns in road safety from around the world that are well documented and evaluated will be discussed in the next section.

4.2 Examples of Effective Campaigns

As discussed in Section 3.2, there have been many campaigns that have been successful in changing behavior and reducing crashes. This section will provide a small sample of these campaigns that have been found to be effective.

4.2.1 Community Campaign on Child Booster Seat (Ebel et al, 2003)

A community campaign to increase child booster seat use was conducted in King County, Washington in 1999. Four communities in the greater Seattle, Washington area served as the intervention sites and eight communities in Portland, Oregon and Spokane, Washington served as control sites. Evaluation of the campaign by Ebel et al (2003) found that the use of child booster seats before the campaign in the intervention areas was 13.3% and 17.3% in the control sites while the corresponding seat use rates in the period after was 26.1% and 20.2%. The researchers thus concluded that the campaign had significantly increased the use of child booster seats.

The campaign targeted both parents and children. It sought to increase parental awareness of the need for booster seats, reduce the motivational and financial barriers to purchasing a seat, and reinforce booster seat use through public health messages delivered from many different sources (Ebel et al, 2003). The elements of the campaign are shown in Figure 4.2.1 below.

Figure 4.2.1
Elements of Booster Seat Campaign

Booster Seat Campaign Elements

Community coalition of agencies and organizations to promote the use of booster seat

Citizen advisory of parents and caregivers to provide feedback on the campaign messages and materials and to develop strategies to ensure community involvement

Broad-based community education program to increase knowledge and awareness of the importance of booster seat use, which included:

- Newspaper articles
- Organization and groups newsletter articles
- Booster seat website
- To sheets, brochures, and flyers in multiple languages
- Telephone information line where parents can call for materials and with questions about booster seats and car seats
- Resource kits for preschools and health care providers
- Radio public service announcements
- Television public service announcements
- Local news reports
- Educational programs to barriers to booster seat use, including defining types of booster seats, identifying where devices are available, and providing alternatives for automobile with lap-only belts

Discount booster seat coupons

Car set training programs and in-service for health care providers, child care providers and educators, law enforcement, emergency medical services personnel, and child passenger safety advocates

Source: Ebel et al (2003)

Social marketing provided the structure for campaign development. Audience focus was narrowed to parents with young children aged 3-5 years. The booster seat message was clear and

specific. A variety of tactics were used including media, publicity, educational outreach, policy change, and provider education. All messages used were consistent and emphasized the benefits of booster seat use and the consequences of not using one. Social learning theory constructs were considered in specific program elements and contents of materials were designed to build parent confidence in choosing and using a booster seat (Ebel, 2003).

Before the campaign launch, three focus groups with parents were conducted to investigate the reasons for booster seat use and non use and to test the efficacy of the messages. Participants responded to a range of questions about booster seat knowledge, attitudes, beliefs and behaviors. Information from the focus group guided message development and priorities. The King County Booster Seat Coalition was formed to bring together parents, public health professionals, community outreach workers, childcare providers, law enforcement officers, physicians, emergency medical technicians and educators. Coalition members helped set priorities for the campaigns and spearheaded outreach efforts. They developed classes and health fair events for families and disseminated booster seats materials, and discount coupons (Ebel, 2003).

A booster seat hotline and a website were also set up to provide families with information. The web site received 81,000 hits per month by August 2002. With support from a booster seat manufacturer and a retail outlet, $10 discount coupons were provided to families, which would reduce the price of a low back booster seat to under $20.

4.2.2 Designated Driver Campaign (Winsten & deJong, 2001)

The designated driver concept has been heavily promoted by the Harvard Alcohol Project (HAP) which is a national campaign launched in 1988 by the Center for Health Communication at the Harvard School of Public Health. Working with the cooperation of leading television networks and Hollywood production studios, the campaign's thrust is to promote an emerging social norm that the driver should abstain from alcohol (Winsten & deJong, 2001). A Gallup poll survey in September 1998, 2 months prior to the campaign's start, found that 62% of all respondents said that they and their friends used a designated driver all or most of the time. This percentage increased steadily to 66% in early 1989 and 72% by mid 1989.

HAP's media strategies include dialogue placement in top-rated network series, prime-time public service announcements sponsored by the major television networks and major news coverage (Winsten & deJong, 2001). Estimated by one industry expert to have a value of more than $100 million, the designated driver campaign had the frequency and reach of a major commercial advertising campaign. During the first year, HAP held a reception for production studio executives, producers, and actors. An invitation was sent to the guest with a reminder of their commitment to the campaign.

According to Winsten and deJong (2001), several factors are critical to the success of the campaign, which may limit the applicability of the model for other health promotion efforts. First, HAP has access to top Hollywood executives and major television networks. Second, the designated driver concept has several important features that distinguish it from other public health topics and make it a more attractive theme for producers and network executives. The role of the television industry could accurately be described as one of reinforcing an emerging trend, rather than engineering a new one. Third, the designated driver message, by emphasizing individual responsibility to prevent drunk driving, meets the television industry's need to do something positive while not alienating the alcohol industry, on which broadcasters depend for a significant portion of their advertising revenue.

4.2.3 Transport Accident Commission (TAC) Campaigns, Victoria, Australia

Road crashes are a major cause of deaths and serious injuries in Australia. For example, there were 1970 fatalities and 21,989 serious injuries resulting from traffic accidents in 1996 and the annual social cost of road crashes was estimated at A$15 billion (BTE, 2000). In an effort to reduce the road trauma, transport authorities around Australia implemented a series of countermeasures targeted at some of the more significant contributing factors to serious crashes, including speeding and drink driving. The primary approach adopted in most states is a combination of high levels of traffic enforcement that is supported by intensive publicity campaigns, particularly television advertising campaigns. The Australian State of Victoria, for

example, conducted an average of 53,727 breath tests per month (with a standard deviation of 20,563) between July 1989 and December 1992 (Tay, 2005a,b).

To support the high level of enforcement activities, transport authorities in Australia also engaged in intensive publicity campaigns. The intensive use of high budget, paid road safety advertising campaigns was first adopted by the Transport Accident Commission (TAC) in the Australian state of Victoria at the end of 1989. These "commercials of death," as they are sometimes called, rely on high-fear "shock-and-gore" advertising in their attempt to change the attitudes and behaviors of drivers (Chulov, 2002). Besides some ethical concerns on the use of high fear appeals, these campaigns also generated heated public debates because of the large expenditure invested (Tay, 2002a, 2004, 2005a,b; Lewis et al, 2003a,b, 2007b). For example, the TAC in Victoria alone invested A$70 million on a variety of road safety campaigns between 1990 and 1995 (Healy and Forsyth, 1996).

Since its implementation, the Victorian anti-drink driving enforcement and advertising campaign has been extensively evaluated (Cameron et al, 1993; Newstead et al, 1995; White et al, 2000; Cameron and Newstead, 2000). Initial evaluations commissioned by the Transport Accident Commission (TAC) and conducted by the Monash University Accident Research Centre (MUARC) concluded that the high levels of enforcement and publicity activities resulted in significant decreases in serious crashes associated with speeding and drink driving (Cameron et al, 1993; Newstead et al, 1995). These positive results formed the basis of the recommendations from MUARC consultants to the transport agencies from other states in Australia, New Zealand and South Africa to embark on similar campaigns (LTSA, 1998; Tay, 1999, 2001a; White et al, 2000; Tay and Watson, 2002).

4.2.4 Supplementary Road Safety Package (SRSP), New Zealand

With about 16 deaths per 100,000 people, New Zealand has one of the highest road fatality rates in the world (Statistics New Zealand, 1998). The estimated social cost of traffic accidents in New Zealand was about NZ$3.3 billion in 1994 (Chapple et al, 1996). In an effort to reduce the road

fatalities, the Land Transport Safety Authority of New Zealand implemented a Supplementary Road Safety Package (SRSP) in October 1995 (Tay, 1999, 2001).

The SRSP was modeled after a similar campaign implemented in December 1989 in Victoria, Australia. The Transport Accident Commission ran a series of television advertisements (known commonly as the TAC campaign) that were characterized by graphically violent car crashes and bloody crash scenes (Macpherson and Lewis, 1998). The main focus of the advertisements was on alcohol impaired driving and speeding, but these were later supplemented by the rural driving and seat belt use campaigns (LTSA, 1998). The initial cost of the campaign was NZ$7 million a year and it was increased to NZ$9.8 million in 1997 (Marketing, April 1998). A budget of NZ$50.06 million was allocated for the campaign until the end of 1999 (Cameron and Vulcan, 1998).

After the implementation of the SRSP, the number of road fatalities dropped initially and the LTSA was quick in claiming success of the campaign (Evening Post, 31/1/96; Sunday Star Times, 7/7/96). The campaign also won the overall Golden Pinnacle award in 1998 for advertising effectiveness (The Press, 29/6/98). An evaluation by Cameron and Vulcan (1998) found that the SRSP advertising campaign was effective in reducing the number of alcohol related serious crashes. Their findings were refuted by Macpherson & Lewis, (1998) who found that the campaign had little impact on drinking driving behavior. Using the same data, Tay (1999) and Tay (2001) re-estimated the effects of the publicity campaigns and tested several model specifications and assumptions inherent in the models developed by Macpherson & Lewis (1998) and Cameron and Vulcan (1998). He found that the campaign was effective in reducing crashes.

4.2.5 Think Campaign, United Kingdom

The UK Government has an objective to reduce road deaths and serious injuries by 40 per cent (50 per cent for children) by the year 2010 (using the average for 1994-98 as the baseline). Key factors in achieving that objective are improved road user behaviour and acceptance of

engineering and enforcement initiatives that increase road safety. Education and publicity play a key role in raising consumer awareness and acceptance. Road safety publicity aims to:[*]

- ensure that there is a high profile for road safety as a matter for general concern
- complement police and local authority activities
- encourage broader support from private sector partners
- get across specific messages to target audiences
- generate media interest in road safety issues

In order to achieve its objectives, the THINK campaign was developed to:

- involve a broad spectrum of society in promoting safer roads for everyone
- encourage and reinforce attitudes that lead to safer and more considerate behavior by all road users
- promote understanding of the need for better road safety behavior
- contribute to the general aim of reducing road casualties and meeting the casualty targets for year 2010

The basic approach adopted is a national publicity campaign using a mix of emotion and facts that raise the profile of road safety and a range of media channels - TV, radio, press, posters, ambient etc. - to provide a national platform to stimulate complementary regional and local authority activity and to encourage private sector companies to cascade messages to their employees and customers. A range of free publicity material is available to local authorities and others to promote the consistency of messages at the national and local levels. The government has also entered into sports sponsorship with the Rugby Football League and the English Football League to enable them to get the messages across to a wider audience using a celebrity based approach.

Road safety advertising has been a key priority for many years. In the past, advertising focused on specific themes such as drink driving and seat belts. In recent years, the campaigns have communicated many more messages - such as fatigue and the use of mobile phones. The campaign wanted people to see that these extra individual messages were part of an overall

[*] http://www.thinkroadsafety.gov.uk/introduction.htm

campaign to improve road safety. So in June 2000, a new campaign was launched under one banner - THINK! - to unite the various road safety messages.

The aim of government road safety campaigns is to reinforce the need for drivers and other road users to take responsibility for their own safety and for the safety of others on the road. In the wider context, the theme of personal and social responsibility is central to the government's philosophy and to its transport policies to encourage more responsible travel choices. The encouragement for more people to walk or cycle, instead of driving, makes the promotion of safety for more vulnerable road users and the responsible and considerate behavior of drivers even more important.

The THINK! campaign was therefore launched:

- To contribute to achieving the targets for road casualty reduction by year 2010, as set out in the government's policy strategy document "*Tomorrow's roads: safer for everyone*".
- To use all the marketing tools available to get across road safety messages effectively and meaningfully.
- To draw together a wide range of road safety messages under a single concept.
- To get across specific advice to road users while impressing on all the need to THINK! while using the road.
- To help to stimulate a year round presence under a new road safety brand.
- To encourage new partnerships to associate with the brand in promoting road safety.

Road safety publicity campaigns raise public awareness that accidents do not just happen; rather, they are caused. Public awareness campaigns can help to influence the attitudes and behaviors that cause accidents. They also create public acceptance for safety engineering and police enforcement and they give national focus and context for local initiatives aimed at making the roads safer and they allow third parties to carry road safety messages in the context of their own commercial activities.

4.2.6 Walk Alert - Drive Alert Campaign (Koenig & Wu, 1994)

As part of its traffic safety campaigns, the Capital Region District's Traffic Safety Commission in Victoria, British Columbia, Canada undertook a multifaceted pedestrian safety campaign that was generally described as the "Walk Alert - Drive Alert" campaign (Koenig & Wu, 1994). The campaign ran from August 31 to October 14, 1990, with radio and television spots, newspaper and magazine advertisements, bus boards, pamphlets, press kits, affiliated promotions by merchants, and related activities (Koenig & Wu, 1994). The television component of the campaign was repeated from January 9 to February 17, 1991. Koenig & Wu (1990) provided an example of the radio spot that was typical of the type of campaign being conducted:
"Making a left at a traffic light in heavy traffic is like playing Russian roulette... and you're the loaded gun. *Check the light*. Check the crosswalk. Check for oncoming traffic. Double-check the pedestrians. When you go off [squealing tires sound effect] you could have a pedestrian's life in your hands. As a driver making a left turn - YOU set the pace for safety! *Drive alert.* As a pedestrian - *Walk alert* -always keep on looking for traffic as you cross a street. *Walk alert/Drive alert.*"

The researchers employed a simple pre-post test design without a comparison group to evaluate the effect of the campaign. The performance measure was the percentage of drivers who were observed not yielding to pedestrians at five signalized intersections. Using a logistic regression model, the researchers found that drivers' failure to yield decreased from 25.2% to 16.8%. To examine the longer term effects, the baseline data were compared with another set of observations 52 weeks later. A statistically significant improvement in yielding behaviors was found both with and without adjustments for controlling variables, such as driver characteristics (gender and age group), type of vehicle, turning movement, pedestrian flow, time of observation, location, weather and visibility.

4.3 Recommended Best Practices

4.3.1 SUPREME Project

The objective of the SUPREME project is to collect, analyze, summarize and publish best practices in road safety in the member states of the European Union as well as in Switzerland and Norway, with a view to implementation in as many partner states as possible. One of the nine thematic reports focuses on education and campaigns (Silverans & de Neve, 2007). Silverans & de Neve (2007) conducted a literature review and surveyed experts in the member states in the European Union to identify the characteristics that were important for an effective campaign.

A summary of the best practices recommended by most of these researchers is provided below:

- Use of an underlying theoretical model;
- Consideration of prior research on the issues addressed in the campaign;
- Use of campaign supports such as legislation, enforcement and public relations or associated publicity;
- Type of appeal approach adopted in the campaign and the media mix used to transmit the message;
- Intensity, duration, timing and exposure of campaign;
- Effective campaign management including a responsible key agency, a limited number of messages, development decisions based on research and community support.
- Plan an evaluation to measure the effect of the campaign.

4.3.2 Global Road Safety Partnership

The GRSP website states that simple messages, which use realistic scenarios have been found to be the most effective. However, account must be taken of the local context. For example, the use of explicit images of injured persons, whilst hard hitting and attention-grabbing in some societies, can offend and cause people to switch off in other places.

The following are the key elements of a publicity campaign that need to be considered in the planning stage:[1]

- Target behavior
- Target audience
- Appeals to motivate the audience
- Message content
- Audience activation
- Media selection
- Campaign timing

The GRSP website also provides some recommendations for implementing the campaign:

- **Define the problem**. Base the campaign on information. Determine the behavioral factors involved in the type of crash or injury under investigation. Define the key features of the behavior to be addressed. Identify the target group. Assess the social context for the campaign. Consider relevant research and analyze what has worked before and elsewhere. Identify the complementary government and/or community interventions required to support the desired change in behavior.

- **Determine objectives.** The campaign objectives should be specific. They should always be linked to a measurable behavior change. The objectives can be about shifting community understanding and support for government policies - such as wearing a seat belt or helmet - or about what to do to improve safety, such as driving more slowly.

- **Agree supporting activities.** Political support is essential, at the national or local level depending on the issues. Identify the key interventions required to support the desired change in behavior and the organizations responsible. The police are generally the most important. They are essential partners for campaigns targeting anti-drink driving, anti-speeding and seat belt and helmet wearing, especially when laws are in place that provide effective sanctions for non-compliance. High profile policing can send a powerful deterrent message.

- **Define a manager.** Successful campaigns are normally managed by a lead agency in consultation with other stakeholders. The lead agency is usually the responsible government department, a national road safety council, or a road safety non-governmental organization. Credibility is crucial. Those conducting and designing the campaign must be seen to be both knowledgeable and impartial.

- **Use the right skills.** Road safety publicity campaigns require a combination of skills. Specialists with behavioral and social science skills should design the content of the campaign and identify the target audience and messages. Delivering the message requires marketing, social advocacy and advertising skills. Project management skills are needed to deliver the campaign on time and within budget.

[1] http://www.grsproadsafety.org/?pageid=329&template=campaigns

- **Communications brief.** Summarize the behavioral and social objectives of the campaign, the supporting government/community interventions, the target audience and the scope of the campaign. Outline a communications strategy, based on market segmentation and targeting, and the resources available to support the campaign.

- **Appoint an agency.** Recruit an advertising agency to design the campaign in collaboration with the lead agency. It may also be necessary to recruit an independent market research company to help design the campaign.

- **Develop the campaign.** Seek creative ideas on how to convey the messages - keep them simple, clear and few. Test creative concepts on a pilot sample of the main target audience and use the feedback to finalize the campaign. Research is crucial to developing effective approaches and they are likely to vary for different target groups in different cultures. Other government, community and police supporting actions should be planned in conjunction with the campaign.

- **Deliver the campaign.** Launch the campaign at a high profile media event, complemented by extensive advertising. Keep stakeholders informed of progress so that they can reinforce the key message when opportunities arise.

- **Utilise 'free' publicity.** It is often possible to place editorials and stories in the press to back up paid advertising. There may also be public service radio and TV available, although the market penetration of these services is often limited.

- **Evaluate the impact.** All major campaigns should be evaluated. This is often done through a pre- and post-campaign survey. Measure behavioral changes, such as improved seat belt or helmet wearing, or reduced speeds. However, sustainable behavioral changes take time to achieve. Short-term changes should be treated cautiously and surveys should also be done long after the campaign launch. These inform decisions about the time intervals between campaigns, for example how frequently to run adverts on TV.

4.3.3 Handbook of Road Safety Measures

Elvik and Vaa (2004) argued that it is not clear how important the lack of information is as a risk factor. Nevertheless, the provision of road user information and campaigns may serve to improve road safety. Elvik and Vaa (2004) suggest that road user information and campaigns are intended to reduce accidents by promoting safer behavior in traffic and by increasing the public's understanding of restrictive measures, such as speed limits, which are introduced to increase safety. Finally, Elvik and Vaa (2004) listed some conditions suggested by Elliot (1993) for succeeding with information campaigns for safer behavior in traffic:

1. Greater changes in behavior are achieved when the initial proportion of road users exhibiting the desired behavior is low than when a high proportion of road users has the desired behavior at the start.

2. Greater changes in behavior are achieved when information campaigns are combined with increased police enforcement than when they are not.

3. Campaigns clearly stating which type of behavioral change is desired, and why it is important to change behavior, lead to greater behavioral changes than campaigns that simply encourage people to be careful in general terms.

4. The use of television as a medium in the campaign appears to lead to greater changes in behavior than other media. This may possibly be due to the fact that television is a medium that reaches a wider public than other media.

4.3.4 The Health Communications Unit

The Health Communications Unit (THCU) organized a workshop on evaluating public service announcements and a summary of what its facilitator, Dr Charles Atkins, considered as key success factors are provided in Thesenvitz (2003). In order to be effective, a public service announcement must:

1. have a clear and realistic objective;
2. be designed for, and tested with a specific focus audience;
3. have a number of qualitative features including:
    a. an appropriate type of appeal;
    b. an appropriate messenger;
    c. credibility;
    d. understandability;
    e. relevance;
    f. high quality mechanical construction;
    g. high quality creative execution.

4. be distributed using channels and vehicles that are suitable for the focus audience and the chosen objective;

5. be distributed in substantial quantity or frequency to ensure that the focus audience is adequately exposed to the message.

In addition, The Health Communication Unit also provided a list of the minimum criteria that must be met in order to develop a persuasive message. THCU recommends that the list, shown in Table 4.3.4 below, be used in conjunction with audience analysis, message pre-testing and campaign evaluation.

Table 4.3.4
Health Communication Message Review Tool

		Excellent	Very Good	Fair	Fail
1	The message will get and maintain the attention of the audience				
2	The strongest points are given at the beginning of the message				
3	The message is clear (i.e., should be easy for the audience to point out the actions you are asking them to take NOW, what the incentives for taking these actions as well as the evidence for the incentives and any background information or definitions)				
4	The actions you are asking the audience to take is reasonably easy				
5	The message uses incentives effectively (more than one type of incentives is used, the audience cares about the incentives provided, and the audience thinks that the incentives are serious and likely				
6	Good evidence for the threat and incentives is provided				
7	The messenger is seen as a credible source of information				
8	Messages are believable				
9	The message uses an appropriate tone for the audience (e.g., funny, cheery, serious, dramatic)				
10	The message uses an appeal that is appropriate for the audience (i.e., rational or emotional). If fear appeals are used, the audience is provided with an easy solution				
11	The message will not harm or be offensive to people who see it. This includes avoiding 'victim blaming'				
12	Identity is displayed throughout				

Source: The Health Communication Unit (http://www.thcu.ca)

4.3.5 Rose25 Project

The Rose25 Project was initiated by the European Union to review the literature and provide a best practice guideline on road safety campaigns. The Rosebud Handbook recommends that the campaign focuses on knowledge, skills and attitudes, and the campaign should be attractive and innovative for the target group:[2]

- Include theoretical and practical elements;
- Focus on knowledge, skills and attitudes;
- Be attractive and innovative for the target group; i.e., raise their interest and create fun;
- Be embedded in other road safety measures, referring to the 3 Es;
- Be embedded in a wider context in school (if it is an action within the school system);
- Be based on broad partnership, create a network and be attached to, or establish, a broader platform.

4.4 Campaigns Evaluation Methods

The Johns Hopkins University Center for Communication Programs (JHU/CCP) was established in 1988 to focus attention on the important role of research-based strategic communications in health promotion and behavior change. The Center follows a theory-driven, research-based approach to its communication, which gives research and evaluation a critical role. Built into different project stages, research and evaluation contribute to the understanding of the processes through which communication affects behavior for purposes of continuous program improvement. Evaluation designs and methods of analysis used by JHU/CCP include:[3]

- *Pre and post data collection* (often using surveys) with audience members exposed to the campaign and control or comparison groups of those not exposed
- *Panel surveys* in which the same members of the campaign's audience are interviewed before, during, and after the campaign
- *Interrupted time-series analysis* of indicators (e.g., health service statistics) before and after the campaign

[2] http:\\partnet.vtt.fi\rosebud\ cited in Silverans & de Neve (2007)
[3] http://www.gse.harvard.edu/hfrp/eval/issue20/eval.html

- *Analysis of intervening effects* using statistical techniques, such as multiple regression to rule out factors that may be confounding evaluation results, and path analysis, to determine the effects of intervening variables and the causal pathways of communication
- *Interaction analysis* to examine the synergistic effects of mass media, interpersonal communication, and participation in community-level activities
- *Cost-effectiveness analysis*, which divides the total cost of the communication intervention by specific indicators of change attributed to the campaign
- *Communication (social) network analysis* to assess how information diffuses within a group or community, and to assess the effects of social influence on the adoption and maintenance of new behaviours
- *Image (character or method) mapping* to scale audience perceptions

It is recommended that CRISP employs at least one of the above mentioned methods to evaluate its campaign regularly. It is important to note the difference between these evaluations of the targeted outcomes or efficacies of the campaigns and the conceptual evaluations of the advertisements themselves during the development and pilot testing stages. The conceptual evaluations focus more on audience's perception of the various message components as postulated by the theoretical behavioral change models and their expected effects on attitudes and intentions, whereas the outcome evaluations focus on self-reported attitudes and behavioral changes, as well as the changes in actual on-road behaviors and collisions.

4.5 Summary

Effective road safety campaigns can have both a direct effect in reducing traffic collisions by changing driver attitudes, intentions and behaviors as well as an indirect effect by raising public awareness of road safety issues and garnering support for the implementation of other road safety measures, especially traffic enforcement. To increase the likelihood of success, a campaign should be developed using the four steps in social marketing proposed by Kotler et al (2002), which includes identifying where we are, where we want to go, how to get there and how to stay the course. It also has to follow widely accepted scientific practice in terms of program design, implementation and evaluation. In summary, it should have the following elements:

- Consideration of prior research on the issues addressed in the campaign.

- Use of an underlying theoretical model.
- Use of appropriate media mix to transmit the message.
- Campaigns should clearly state which type of behavioral change is desired, and why it is important to change behavior rather than simply encourage people to be careful in general terms.
- Focus of the message should be on highlighting the severity and likelihood of crashes resulting from the risky driving behavior targeted and the benefits to the target audience of taking the recommended preventive action or safety driving behavior.
- The strength and logic of argument must be very clear and indisputable; use of counterfactual arguments when appropriate.
- Message must be attractive for the target group and recommended preventive action must be something that they are willing and able to do.
- Have a number of qualitative features including:
    - an appropriate type of appeal;
    - an appropriate messenger;
    - credibility;
    - ease of comprehension;
    - relevance and realism;
    - high quality production.
- Be integrated with other road safety measures.
- Be based on broad partnership, create a network and be attached to, or establish, a broader platform.
- Have an effective campaign management including a responsible key agency, a limited number of messages, development decisions based on research and community support.
- Sufficient resources to meet the needs in terms of intensity, duration, timing and exposure of campaign.
- Plan an evaluation to measure the effect of the campaign.

5.0 Review of Existing Campaigns and Suggestions for Future Campaigns

5.1 Introduction

Motor vehicle collisions are a leading cause of injury-related death and disability among Capital Region residents. Each year, there are approximately 25,000 collisions in the region and over one in four results in injury or death. Each year, two out of three injury collisions occur in intersections. To address this critical problem, stakeholders in Alberta's Capital Region have combined efforts to reduce the frequency and severity of intersection collisions.

The Capital Region Intersection Safety Partnership (CRISP) is comprised of the following traffic safety and injury prevention stakeholders:

- Capital Health
- Edmonton Police Service
- St. Albert RCMP Detachment
- Strathcona County RCMP Detachment
- Alberta Motor Association
- City of Edmonton
- City of St. Albert
- Strathcona County

The CRISP team is uniquely qualified to implement successful, comprehensive, and integrated traffic safety initiatives owing to a diverse and multi-sectoral group of experienced, skilled, and committed traffic safety and injury prevention stakeholders. CRISP shares resources and expertise to implement on-going, collaborative, and integrated intersection safety initiatives to reduce the frequency and severity of intersection collisions in the Capital Region of Alberta. The partnership has been working together since 2001 and has successfully implemented and coordinated traffic safety campaigns with the long-term goal of reducing traffic trauma (CRISP, 2007).

5.2 Overview of the CRISP Campaigns

A key activity that CRISP is involved in is semi-annual campaigns. Some focus testing of these campaign messages has been completed to determine how much they have resonated with targeted audiences. To evaluate how effective the campaigns have been received, phone based surveys have been conducted to determine the public's recollection of the media messages. A summary of the campaigns between 2001 and 2006 is shown in Figure 5.2 below:

Figure 5.2
CRISP Campaigns

2001: Red means stop!
The first campaign, Red means stop!, was implemented in 2001. This campaign focussed on red light infractions and was highly successful in reducing red light violations at intersections and raising driver awareness of the dangers of intersections.

2002: Look out for each other - Share the Responsibility.
In 2002, a second CRISP campaign was implemented which targeted pedestrian safety - Look out for each other - share the Responsibility.

2003: Speed through intersections: Drive to Live brand.
In 2003, the partnership implemented a campaign to address the third strategic area - Speed through intersections. In addition, CRISP continued to raise awareness of pedestrian safety with a spring campaign and developed the Drive to Live to brand all education and awareness material.

2004: High crash zone dead ahead.
In 2004, CRISP carried out public awareness and targeted research around high crash locations, the fourth strategic area, in the campaign High crash zone dead ahead.

2005: Run a red and stop dead.
In 2005, the focus shifted back to the red light and stop sign issue with an updated Run a red and stop dead campaign.

2006: Intersection ahead. Slow down or be dead quick.
2006 brings a focus back to the speed issue again. Intersection ahead. Slow down or be dead quick is the latest campaign that reminds drivers that speed kills - especially at intersections.

5.3 Survey Methodology to Evaluate Some CRISP Campaign Materials

5.3.1 Survey Participants

The questionnaire was administered to a convenient sample of 26 participants in a pre symposium workshop on creating a safety road culture. Of the 26 respondents, 44% are male and 56% are female drivers. 4% of the respondents are between 16-25 years old, 52% are between 26 and 45 years old and 44% are between 46 and 65 years old. It should be noted that the sample was chosen for convenience and not as a representative sample and the results of the survey should be interpreted with care. Nevertheless, it provides an adequate sample for the conceptual evaluation of the two messages. More importantly, the direction of bias is known and the results should thus be considered as an "upper bound" on the expected effectiveness. Continuing effort is underway to obtain a broader sample to supplement the sample.

5.3.2 Survey Questionnaire

To determine the effectiveness of the previous CRISP campaigns, a simple questionnaire survey was conducted to gather information on drivers' perceptions of and response to three of the posters used in previous campaigns. The posters are shown in Figure 5.3.2a below.

Figure 5.3.2a
Posters Evaluated in Survey

Poster A

Poster B

Poster C

A copy of the questionnaire for the 'share the road poster' is shown in Figure 5.3.1b below. It should be noted that the questionnaires for the other two posters are very similar except for the few questions on driving intentions which are modified to reflect the relevant preventive actions to avoid running red light and following-too-closely.

Figure 5.3.2b
Sample of Survey Questionnaire

□□□□□□

CRISP POSTERS SURVEY A

Thank you for consenting to participate in this survey

- Your participation is entirely voluntary. Please feel free to withdraw at any stage
- There are no right or wrong responses
- The survey is anonymous and confidential, so please reply as honestly as possible

You are asked to answer most questions by circling the desired number on each 5-point scale to indicate the extent to which you agree or disagree with the statement. The lowest number (1) indicates strongly disagree, while the highest number (5) indicates that you strongly agree with the statement.

Please indicate your perceptions or reactions to the advertisement shown

1. The advertisement showed me that the threat associated with driving at intersection is very severe

   Strong Disagree ← 1 2 3 4 5 → Strongly Agree

2. The advertisement showed me that the threat associate with driving at intersection is likely to happen to me

   Strong Disagree ← 1 2 3 4 5 → Strongly Agree

3. The advertisement provided a clear strategy to cope with the dangers at intersections

   Strong Disagree ← 1 2 3 4 5 → Strongly Agree

4. The advertisement showed me a way to cope with the dangers at intersections that is effective

   Strong Disagree ← 1 2 3 4 5 → Strongly Agree

5. The advertisement showed me a way to cope with the dangers at intersections that I am willing to do

   Strong Disagree ← 1 2 3 4 5 → Strongly Agree

6. The benefits of adopting the strategy shown to avoid the dangers at intersections are very clear to me

   Strong Disagree ← 1 2 3 4 5 → Strongly Agree

7. The costs of not adopting the strategy shown to avoid the dangers at intersections are very clear to me

   Strong Disagree ← 1 2 3 4 5 → Strongly Agree

8. The driving situation and message in the advertisement shown is realistic and credible

   Strong Disagree ← 1 2 3 4 5 → Strongly Agree

9. The advertisement increased my intention to give way to pedestrians and cyclists at intersections

   Strong Disagree ← 1 2 3 4 5 → Strongly Agree

10. The advertisement increased my intention to look out for pedestrians and cyclists at intersections

    Strong Disagree ← 1 2 3 4 5 → Strongly Agree

End of Survey, Thank you

Since the posters were not designed using any behavioral change model, the key constructs from several of the common models reviewed earlier were included in the questionnaire. In particular, the survey elicited viewers' ratings on whether the key success elements were shown in the posters and perceived by the viewers including the severity and likelihood of the threat, response efficacy or coping strategy shown, self-efficacy or feasibility of the coping strategy, costs and benefits of the coping strategy or preventive actions, as well as the effect of the advertisement on the viewers' driving intentions. Participants' responses were recorded using the standard 5-point Likert scale which ranges from Strongly Disagree (1) to Strongly Agree (5).

It should be noted that in designing the questionnaire, greater emphasis was placed on limiting the length of the survey due to expected time constraints and the repetition of the survey for three posters. Nevertheless, the items used were expected to be very reliable. Reliability analysis using SPSS version 11.8 produced very high estimated Cronbach Alpha values of 0.9208, 0.9225 and 0.9471 for posters A, B & C respectively.

5.4 Survey Results

5.4.1 Evaluation of Poster A

The respondents' perceptions of the first poster (Poster A) are shown in Table 5.4.1a below. The percentages of respondents who indicated the different levels of agreement or disagreement with the various statements (displayed in the first column) about the poster being tested are tabulated (columns 2-6). Since all the statements are written in a positive light, strongly agree and agree responses indicate that the message being evaluated has that particular component, highlighted in the statement, that is critical to the success of the message.

Table 5.4.1a
Perceptions of Poster A

Items	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
The advertisement showed me that the threat associated with driving at intersections is very severe	26.9	30.8	34.6	7.7	0.0
The advertisement showed me that the threat associated with driving at intersections is likely to happen to me	26.9	23.1	38.5	11.5	0.0
The advertisement provided a clear strategy to cope with the dangers at intersections	19.2	26.9	30.8	19.2	3.8
The advertisement showed me a way to cope with the dangers at intersections that is effective	30.8	26.9	19.2	15.4	7.7
The advertisement showed me a way to cope with the dangers at the intersections that I am willing to do	23.1	19.2	15.4	26.9	15.4
The benefits of adopting the strategy shown to avoid the dangers at intersections are very clear to me	23.0	26.9	26.9	19.2	3.8
The costs of not adopting the strategy shown to avoid the dangers at intersections are very clear to me	42.3	30.8	15.4	7.7	3.8
The driving situation and message in the advertisement shown is realistic and credible	19.2	23.1	26.9	19.2	11.5
The advertisement increased my intention to give way to pedestrians and cyclists at intersections	15.3	19.2	30.8	26.9	7.7
The advertisement increased my intention to look out for pedestrians and cyclists at intersections	15.3	23.1	11.5	42.3	7.7

One of the main concepts that most theoretical models of behavior change has is the susceptibility of audience to the threat. An effective message should aim to clearly portray both the severity and likelihood of the threat. It is clear from the results shown in Table 5.4.1a that most respondents strongly disagree or disagree with the statement: “The advertisement showed me that the threat associated with driving at intersections is very severe". According to the fear drive model, the health belief model, the extended parallel process model and social cognition theory, if the audience does not perceive the threat to be severe, then they are not likely to change their behavior.

In addition to the severity of the threat, the likelihood of the threat happening to the audience also plays a significant role in determining the threat level. As shown in Table 5.4.1a, most of the respondents strongly disagree or disagree with the statement: "The advertisement showed me that the threat associated with driving at intersections is likely to happen to me". Together with the previous result, we can infer that the poster did not portray a sufficient level of threat, which is a key success factor for road safety messages. More importantly, the perceived level of threat is expected to be lower for the general public than for the sample used, which consists of mainly road safety professionals. Thus, the advertisement is not expected to instill a strong motivation in the audience to change their behavior.

Besides the perceived threat, another important message component is the coping strategy provided. In fact, according to Tay & Watson (2002), it is the most important component of the message. The results of our survey show that less than a quarter (23%) of the respondents perceived that the poster provided a clear strategy to cope with the threat or risks associated with driving at intersections and a similar percentage indicated that they thought the coping strategy shown or implied was effective in dealing with the threat or dangers of driving at intersections. A more encouraging result is that 41.3% of the respondents are willing to adopt the preventive actions shown in the poster to share the road with cyclists and pedestrians. This latter result is not surprising, given that the sample consists of mainly road safety professionals. This percentage may be lower in the general driving population.

The next two items in the survey elicited the respondents' perception of the message regarding its ability to convey the benefits and costs of adopting or not adopting the preventive action. Since the message is positively framed, it is not surprising that more respondents perceive the benefits of adopting the strategy shown (23%) than the cost of not adopting the preventive action (11.5%). These percentages, however, are low to moderate, especially considering the sample used. The likelihood of changing the behavior of the general driving public is, therefore, not expected to be very high. In a rational decision making framework, such as the economic theory of consumer choice, if the decision maker does not see a clear net benefit of an action, then the likelihood of the decision maker adopting the strategy is not expected to be very high.

Two intrinsic qualities of the message that have been shown in the literature to play an essential role in the success of social marketing and public health messages are realism and credibility. The results in Table 5.4.1a show that 30.7% of the respondents felt that the situation and message shown in the advertisement was realistic and credible, whereas 42.3% disagreed or strongly disagreed with the same statement. We can thus infer that the advertisement is expected to have a moderate to low level of peripheral persuasion.

Finally, the last two items measure the audiences' intention to adopt adaptive behavior or safe driving behavior at intersections. Although it was encouraging that a relatively larger share (34.6%) of the respondents felt that the advertisement increased their intention to give way to pedestrians and cyclists at intersections, approximately the same share (34.5%) also disagreed or strongly disagreed with the same statement. The advertisement performed a little better in terms of convincing the audience to look out for pedestrians and cyclists at intersections, with 50% agreeing or strongly agreeing with the statement, while only 38.4% disagreeing or strongly disagreeing with it.

In order to verify that the constructs or message components measured were in fact essential to the success of the message, simple correlations were estimated between the two behavioral intention measures and the eight message components. Table 5.4.1b shows the non parametric correlation coefficients (Kendall's Tau) between the intermediate outcome variables and the respective input variables.

Table 5.4.1b
Correlations between Changes in Intentions and Message Components for Poster A

Message Components	**Give Way**	**Look Out**
Threat is severe	0.256 *	0.173
Threat is likely to happen to me	0.521 ***	0.487 ***
Clear strategy to cope with threat	0.583 ***	0.456 ***
Coping strategy is effective	0.480 ***	0.592 ***
Coping strategy is something I am willing to do	0.503 ***	0.435 ***
Benefits of preventive action is clear	0.530 ***	0.517 ***
Costs of not adopting strategy is clear	0.474 ***	0.572 ***
Situation shown is realistic and credible	0.707 ***	0.707 ***
Note: *, ** & *** denote confidence levels of 90%, 95% and 99% respectively		

It is clear from the results shown in Table 5.4.1b, that the various key components of the message are significantly correlated with the acceptance of the message and the audiences' intentions to take the necessary preventive actions. The only construct that is not highly correlated with the success of the message is the portrayal of the threat to be very severe. This lack of correlation is not as surprising since the message is basically a positively framed message, with little emphasis on the threat. Nevertheless, the overall result supports the main hypotheses in the major theoretical models of behavior change discussed in previous sections.

5.4.2 Evaluation of Poster B

The respondents' perceptions of the second poster (Poster B) are shown in Table 5.4.2a below. There is a moderately high percentage (56.8%) of respondents who agreed or strongly agreed with the statement that the advertisement showed them that the threat associated with driving at intersections was very severe. The corresponding percentage who felt that the message showed them that the threat was likely to happen to them was lower at 26.9%. These results suggest that the poster is moderately able to motivate the audience to seriously consider the threat shown and perhaps take the necessary preventive actions.

Table 1
Perceptions of Poster B

Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The advertisement showed me that the threat associated with driving at intersections is very severe	15.4	15.4	11.5	26.0	30.8
The advertisement showed me that the threat associated with driving at intersections is likely to happen to me	19.2	23.1	30.8	26.9	0.0
The advertisement provided a clear strategy to cope with the dangers at intersections	30.8	15.4	3.8	46.2	3.8
The advertisement showed me a way to cope with the dangers at intersections that is effective	23.1	23.1	23.1	26.9	3.8
The advertisement showed me a way to cope with the dangers at the intersections that I am willing to do	26.9	23.1	19.2	11.5	19.2
The benefits of adopting the strategy shown to avoid the dangers at intersections are very clear to me	23.1	19.2	19.2	15.4	23.1
The costs of not adopting the strategy shown to avoid the dangers at intersections are very clear to me	26.9	15.4	26.9	11.5	19.2
The driving situation and message in the advertisement shown is realistic and credible	23.1	23.1	26.9	15.4	11.5
The advertisement increased my intention to leave enough time to stop when approaching intersections	23.1	26.9	26.9	11.5	11.5
The advertisement increased my intention not to run a red light at intersections	23.1	11.5	34.6	15.4	11.5

On a positive note, 50% of the respondents perceived that the poster showed them a strategy to cope with the threat associated with driving at intersections. However, a moderately lower share (30.7%) felt that the strategy provided was effective and something that they were willing to do. Therefore, we can infer that the message efficacy and self-efficacy of the advertisement is moderate among firm believers, (road safety professionals in the sample), and are expected to be low to moderate among the general driving public.

The share of respondents who perceived the positive benefits of taking the preventive action shown in the advertisement is about 38.5%, while the percentage of respondents who perceived the costs of not adopting the recommended strategy shown is about 30.7%. The perceived benefits and costs of taking or not taking the preventive action is expected to have a significant influence on drivers' behavior. However, the moderate results obtained from a professional sample (converted) imply that the overall effect on the general driving public is expected to be low to moderate.

It is not surprising therefore, that only about 23% and 26.9% of the respondents indicated that the advertisement increased their intentions to leave enough time to stop when approaching intersections and not to run a red light respectively. Moreover, bearing in mind that the sample consists of road safety professionals, this result implies that the expected effectiveness of the advertisement in changing the behavior of the general driving public is deemed to be low to moderately low.

Again, the non parametric correlation between the various message components and the self-reported changes in drivers' intentions were estimated to validate the theoretical models. The estimates of the Kendall Tau statistics are shown in Table 5.4.2b. The results showed a strong correlation and provided some evidence to support the recommendations that future messages should focus on these key components in their design.

Table 5.4.2b
Correlations between Changes in Intentions and Message Components for Poster B

Message Components	**Leave Enough Time**	**Don't Run Light**
Threat is severe	0.371 **	0.387 ***
Threat is likely to happen to me	0.367 **	0.283 **
Clear strategy to cope with threat	0.481 ***	0.388 **
Coping strategy is effective	0.308 **	0.324 **
Coping strategy is something I am willing to do	0.642 ***	0.651 ***
Benefits of preventive action is clear	0.543 ***	0.500 ***
Costs of not adopting strategy is clear	0.454 ***	0.522 ***
Situation shown is realistic and credible	0.611 ***	0.575 ***
Note: *, ** & *** denote confidence levels of 90%, 95% and 99% respectively		

5.4.3 Evaluation of Poster C

Finally, the audience's views on the third poster (Poster C) are shown in Table 5.4.3a below. The results indicated that 54.2% of the respondents felt that the advertisement showed them that the threat associated with driving at intersections was severe, while 25% felt that it showed them that the threat was likely to happen to them. These results suggest that about a quarter to half of the sample may be motivated enough to consider taking preventive actions to reduce the threat associated with driving at intersections.

On the other hand, only a small share (12.5%) of the audience felt that the advertisement showed them a clear strategy to cope with the threat associated with driving at intersections. The same proportion of respondents also felt that the coping strategy shown in the advertisement was effective in dealing with the threat shown. A slightly larger percentage (16.7%) reported that the coping strategy shown was something that they were willing to do. Overall, the efficacy of the message is not deemed to be very high, especially given the fact that the sample consists of road safety professionals.

Table 5.4.3a
Perceptions of Poster C

Items	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
The advertisement showed me that the threat associated with driving at intersections is very severe	20.8	8.3	16.7	37.5	16.7
The advertisement showed me that the threat associated with driving at intersections is likely to happen to me	20.8	20.8	33.3	25.0	0.0
The advertisement provided a clear strategy to cope with the dangers at intersections	29.2	29.2	29.2	8.3	4.2
The advertisement showed me a way to cope with the dangers at intersections that is effective	33.4	37.5	16.7	12.5	0.0
The advertisement showed me a way to cope with the dangers at the intersections that I am willing to do	33.4	16.7	33.3	16.7	0.0
The benefits of adopting the strategy shown to avoid the dangers at intersections are very clear to me	29.2	20.8	20.8	25.0	4.2
The costs of not adopting the strategy shown to avoid the dangers at intersections are very clear to me	25.0	20.8	33.3	20.8	0.0
The driving situation and message in the advertisement shown is realistic and credible	16.7	29.2	20.8	20.8	12.5
The advertisement increased my intention to leave enough time to stop when approaching intersections	16.7	20.8	20.8	37.5	4.2
The advertisement increased my intention to obey the traffic signals	16.7	16.7	29.2	33.3	4.2

As shown in Table 5.4.3a, about 29.2% of respondents felt that the benefits of adopting the strategy were clearly shown in the advertisement and about 20.8% felt that the costs of not adopting the strategy shown were clear. The 20%-30% who perceived the benefits and costs of the adopting or not adopting the preventive action is quite low, given that this is an informed sample of road safety professionals.

About a third of the respondents agreed or strongly agreed with the statement that the driving situation shown in the advertisement was realistic and credible, whereas 45.9% disagreed or strongly disagreed with that statement. These results indicate that the intrinsic qualities of the advertisement should be improved to increase the likelihood of success.

Finally, a relatively high share (41.7%) of the respondents reported that the advertisement increased their intentions to leave enough time to stop when approaching intersections, while 37.5% felt that it increased their intentions to obey the traffic signals. Overall, the effectiveness of the poster in changing the intentions of its audience to take preventive actions to cope with the threat associated with driving at intersections is deemed to be moderate, considering the fact that the sample consists of road safety professionals.

Again, the non parametric correlation between the various message components and changes in audience driving intentions were estimated. As shown in Table 5.4.2b, all the coefficients are positive as expected and highly significant at confidence levels of greater than 99%. These results support the recommendations provided in previous sections about the importance of these message components in determining the success of the message.

Table 5.4.2b
Correlations between Changes in Intentions and Message Components for Poster B

Message Components	**Leave Enough Time**	**Obey Red Light**
Threat is severe	0.473 ***	0.472 ***
Threat is likely to happen to me	0.571 ***	0.578 ***
Clear strategy to cope with threat	0.657 ***	0.553 ***
Coping strategy is effective	0.538 ***	0.532 ***
Coping strategy is something I am willing to do	0.531 ***	0.437 ***
Benefits of preventive action is clear	0.641 ***	0.549 ***
Costs of not adopting strategy is clear	0.588 ***	0.624 ***
Situation shown is realistic and credible	0.650 ***	0.712 ***
Note: *, ** & *** denote confidence levels of 90%, 95% and 99% respectively		

5.5 Suggestions for Future Campaigns

5.5.1 Development and Implementation of Campaigns

As discussed in the previous chapter, to increase the likelihood of success, a campaign should be developed using the four steps in social marketing proposed by Kotler et al (2002), which include identifying where we are, where we want to go, how to get there and how to stay the course. With respect to the development of the advertisement itself, it should have the following elements:

- Consideration of prior research on the issues addressed in the campaign.
- Use of an underlying theoretical model.
- Campaigns should clearly state which type of behavioral change is desired, and why it is important to change behavior.
- Focus of the message should be on highlighting the severity and likelihood of crashes resulting from the risky driving behavior targeted and the benefits to the target audience of taking the recommended preventive action or safety driving behavior.
- The strength and logic of argument must be very clear and indisputable.
- Message must be attractive for the target group and recommended preventive action must be something that they are willing and able to do.

- Have a number of qualitative features including:
    - an appropriate type of appeal;
    - an appropriate messenger;
    - credibility;
    - ease of comprehension;
    - relevance and realism;
    - high quality production.
- Conduct a concept test to ensure that the advertisement possesses the key components that are associated with higher likelihood of changing driver behaviors.

5.5.2 Target Audience and Implications for Campaign Development

Discussions on the target populations are provided in section 2.3. In terms of gender, male drivers are identified as the principal group that contributes relatively more to intersection collisions than female drivers. With respect to age, younger drivers (16-25 years old) form the primary target audience due to their relatively higher collision rates, while the middle-aged drivers constitute the secondary target due to their relatively larger share in the population, which results in more collisions per se. As a target group, young male drivers have certain characteristics that have some implications for the development of successful campaigns.

As suggested by Tay (2005a), Tay et al (2002, 2004), and Lewis et al (2003a,b; 2007a,b,c), male drivers, especially young male drivers, have a greater tendency to adopt defensive mechanism and maladaptive behaviors when confronted with highly emotional and negative campaigns that do not have high efficacy. Therefore, the central route of persuasion that relies more on the strength of the argument has to be the main focus of the message. In terms of the peripheral route, unless a very strong, clear and effective preventive action that young male drivers are willing to adopt can be provided, it is advised that only a moderate level of fear should be targeted as a motivational or driving force. Lastly, the message must be seen as credible to this target group. It is important to note that young male drivers have a very strong third person effect and are likely to discount the threat unless the linkage between the behavior and the negative consequence is clearly shown and presented logically to increase the credibility of the message. Hence, general safe driving messages are less likely to be effective.

5.5.3 Target Behaviors and Implications for Campaign Development

Discussions on the target populations are provided in section 2.5. In terms of road user behavior, left-turn-across-path and following-too-closely are the top two driver behaviors that are alleged to have contributed to intersection crashes, followed by disobeying traffic signal or traffic sign. Ran off the road and improper turning behaviors are also relatively frequent. Educational campaigns should therefore, target these behaviors specifically, instead of simply asking drivers to be careful or showing general threats, since specific campaigns tend to be more effective than general campaigns.

For left-turn-across-path collisions, the primary contributing factor is likely to be improper gap selection and judgment of speed. The negative consequences of such actions can easily be depicted in the advertisement or poster. Making a left with an insufficient gap is likely to result in a side impact or angled crash, which can easily be illustrated in the poster using a simple picture or photograph. The recommended action is simply to be patient and wait for an appropriate gap to appear before making the turn. In this scenario, it may be easier to depict the negative consequence associated with the failure to give way to oncoming traffic, thereby resulting in a crash and supplement it with simple advice to wait for the right gap to cross. An alternative approach may be to present the situation in the form of a simple question: Is the gap sufficient to cross safely?

With respect to following-too-closely, the negative consequences of such an action can also be easily depicted in the advertisement or poster. Following-too-closely is likely to result in a rear end collision with the vehicle in front, which again can be easily depicted using a simple picture or photograph. The recommended action is simply to be patient and leave a sufficient gap from the vehicle in front. This action is also simple to show in an advertisement or poster. However, this action may not be as widely accepted as a high risk behavior. Hence, it is very important that the linkage between the following-too-closely behavior and negative consequence of a crash must be clearly shown in the message. Therefore, although this behavior can be targeted using a positive message by focusing on the preventive action, a negative approach by focusing on the consequence of the risky behavior or a combination of both may be more effective.

In terms of red light running behavior, the negative consequences of such an action is clear to most drivers and is also easy to depict in advertisements or posters using a simple picture or photograph. It can also be highlighted using simple slogans such as “Run a Red and Stop Dead”, adopted in one of the existing posters. Nevertheless, it is still recommended that a picture or photograph be used to increase the impact of the message. The use of picture and photographs can also add realism and increase the ease of comprehension. The preventive action is simple enough to encourage drivers to obey the traffic signals. Again, a negative approach may be more effective and easier to show in the posters.

It should be stressed that the recommended approaches to changing the above behaviors represent only the obvious choices and not the only choices. The theoretical models of behavior change only require that negative consequences of the risky behavior and/or the benefits of the preventive action be clearly presented to the audience. The creative personnel from the advertising agencies will probably be able to create appropriate advertisements or posters using either the negative or positive approach or a combination of both.

5.5.4 Applying Behavioral Theory in Advertisement Development and Testing

In order to apply the theoretical models in designing the poster, we need feedback from the target audience on their perception of the threats associated with driving through an intersection. This information can be gathered by conducting a simple survey or using a focus group. Alternatively, the threat can also be selected based on targeted behavioral issues identified by CRISP using collision data or traffic violation information. These priorities have been identified in Section 2. Once the relevant threat is identified, it can then be used to set the scene for the poster.

Several relevant behavioral change models were presented in section 3.3 and three existing posters were conceptually evaluated in section 5.4 using the key message components proposed by the different theories. Although the information provided will give us a good foundation that can be used in the future development of educational campaigns, it is beneficial to illustrate their

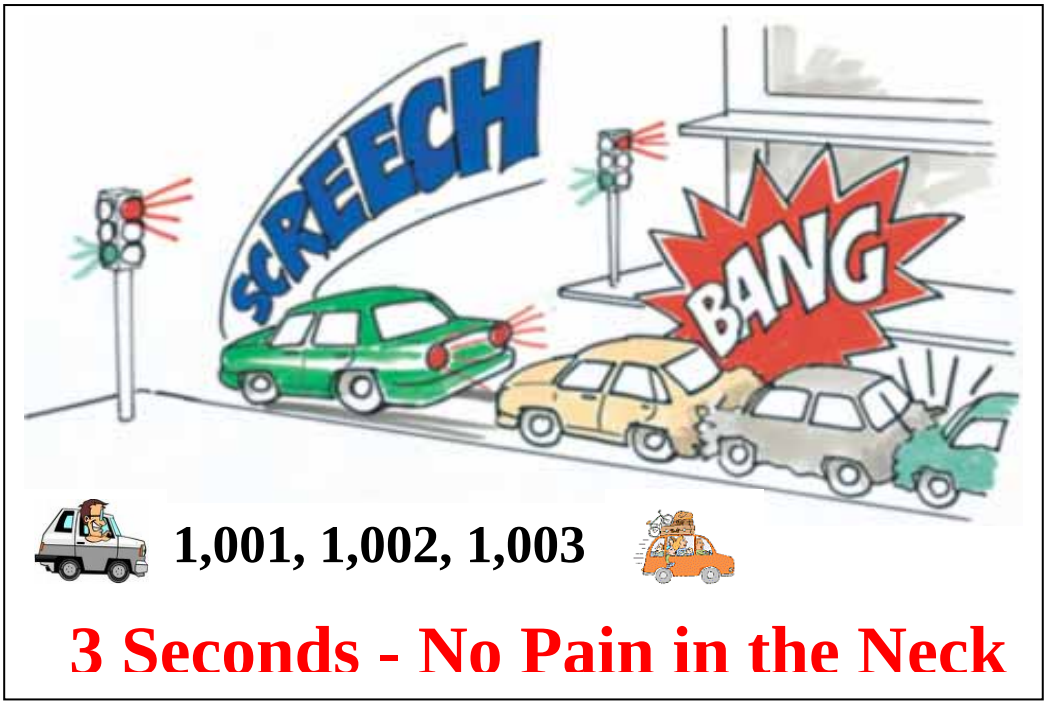
application using an example. An example of a new design for an existing poster is shown in Figure 5.5.4a below

Figure 5.5.4a
Example of a New Design for an Existing Poster

In the poster above, the safety threat at intersections is clearly depicted using the photograph in the background which shows a collision of two vehicles at an intersection. In addition to illustrating the likelihood and severity of the threat, the poster also provides a simple preventive action – obey traffic signals. The negative consequence of not adopting the safe driving behavior recommended is clearly shown in the poster. Although the positive benefit of adopting the recommended action is not explicitly shown, its implication is quite clear. The level of threat shown is expected to be moderate and not excessive, which may have a counterproductive effect on young male drivers. The crash scene is deemed to be quite realistic and credible. The threat can easily be changed to “Run a Red and Stop Dead” instead of “High Crash Zone Ahead”, although the first threat may require a stronger picture that depicts a higher severity crash to be credible and realistic.

Since following-too-closely is one of the top contributing factors of intersection crashes, an example to illustrate the concepts would be useful. Figure 5.5.4b shows a new poster with a picture of a rear end crash at an intersection. The negative consequence of following-too-closely is clearly depicted in the drawing (source: www.atsb.gov.au). To increase its effectiveness, a simple solution (3 seconds gap rule) is also provided in the poster. The 3 seconds rule is a rule-of-thumb used in many places although some places use a 2 seconds rule while others use a 4 seconds rule. CRISP can decide on the most appropriate rule to apply under different conditions. For example, the 4 seconds rule can be promoted in winter and 2 or 3 seconds rule can be promoted in summer. "No Pain in the Neck" has two interpretations: (a) leaving a three seconds gap is not such a big hassle; and (b) leaving a three second gap will not result in a whiplash injury. The logic or argument can be clearly seen in the picture and thus it is deemed realistic and credible. Moreover, the scenario depicted in the picture occurs quite frequently and many motorists would have witnessed similar situations before.

Figure 5.5.4b
Example of New Poster for Following-too-closely



It should be noted that the concepts developed in the new poster shown above can be applied to other contributing factors related to the gap selection as well. For example, the same idea can be used to address the other major contributing factor of intersection crashes: left-turn-across-path. To accomplish this change, the picture in the poster can be replaced by a photograph showing a right angle crash resulting from a left-turn-across-path incident. The preventive action provided can still be applied since it simply advises drivers to make sure that there is a three second gap before turning and crossing.

It has to be emphasized that the above posters serve to provide examples of how the various key components can be incorporated in a poster. It has yet to be tested or evaluated to ensure that these components are in fact present in the poster and perceived as such by the target audience. Therefore, once the poster has been developed, the next step is to test the design and message content. Again, a simple survey or focus group can be conducted to gather feedback from a sample of the target population. One simple way to test the message is to use the questionnaire shown in Figure 5.3.2b. The data collected can then be analyzed using the procedures described in Section 5.4. Note that the questionnaire shown should be used only as a guide and should be modified accordingly to suit the new design. Also, it should be noted again that the redesigned and new posters shown, serve only as examples to illustrate how the various key components can be incorporated and not as examples of creative designs, which are best left for professionals in the advertising industry to develop.

5.5.5 Relationship with Other Traffic Safety Initiatives

As discussed in section 3.2.2, the relationship between enforcement and educational campaigns is not as clear as commonly believed and depends largely on the road users and behaviors targeted, theoretical approaches used to design the campaigns, and drivers' response to these campaigns. With respect to these behaviors targeted in intersection safety, left-turn-across-path collisions are not easy to address using enforcement, although more police presence may reduce the traffic speed and thus reduce the likelihood and severity of this type of crash. Hence, efforts

to reduce left-turn-across-path collisions should rely more on education than enforcement campaigns.

On the other hand, behaviors like red light running can be targeted using enforcement since the link between red light running and crash risk is quite clear and widely accepted by the public. Hence, red light running enforcement and education campaigns can be done independently, because there is less need to do them both concurrently.

Finally, behaviors like speeding and following-too-closely may need both enforcement and education campaigns to be performed concurrently. Many drivers do not realize that they have a problem with speeding or following-too-closely. Hence, they belong to the pre-contemplation stage in the trans-theoretical model of change and a strong emotive appeal in the communication is needed. In addition, the communication may need to be complemented by enforcement to be effective.

Most of the best practice guidelines discussed in chapter 4 recommend that the campaign be integrated with other road safety activities. Aside from the relationship between publicity and enforcement campaigns, little research or evidence exists to support this recommendation. Nevertheless, it is recommended that the CRISP campaign be coordinated with other programs like the Alberta Traffic Safety Plan because the strategy has high face validity. It is important to monitor and evaluate this strategy to ensure that, it in fact, adds to the CRISP publicity campaign and not otherwise.

5.5.6 Evaluation of Campaign

Again, most of the best practice guidelines for conducting campaigns recommend that the campaigns be evaluated for their effectiveness. Among the various methods suggested by the Johns Hopkins University Center for Communication Programs, it is recommended that pre and post comparison and/or a panel survey be conducted to assess the success of the campaign in terms of changing attitudes and behaviours of drivers. These evaluations can be conducted using

a modified version of the questionnaire shown in Figure 5.3.2b and administering it to a sample of drivers targeted.

In addition, collision and violation data can be analyzed using the before-after study with a comparison group method as outlined in Marko et al (2005). This approach is feasible for a CRISP campaign, especially a poster campaign, since it is more localized and intersections can be divided into treatment and comparison groups. The use of interrupted time series analysis and other regression models require some training in advanced statistics and should be conducted by a consultant, if necessary.

5.6 Summary

In this chapter, we provided a review of CRISP campaigns, using three existing posters that have been used in recent years. The review and evaluation was designed with two related objectives in mind. First, we wanted to evaluate the effectiveness of the advertisements in changing the audience' driving intentions. Our results showed that the advertisements had a moderate effect in changing the respondents' intentions to take preventive actions when driving at intersections. Since the sample consists of road safety professionals, who are more predisposed to road safety measures than the general driving public, it is safe to infer that the effectiveness of the advertisements in changing the driving behavior of the general public will only be low to moderate at best.

Our second objective is to measure the audience's perception of the advertisement in terms of the key message components that are hypothesized by the various theoretical models to be significant in determining the success of the message. The measurements of these key message components are conducted for two purposes. First, they provide valuable insight into the design of the message and their abilities to persuade their audiences to change their driving behaviors. Second, they provide the data needed to test the efficacy of the theoretical models. Non parametric correlations between the self-reported changes in driving intentions and the various key message components were estimated. Our results showed that the message components were significantly related to the changes in driving intention, implying that the various constructs were

essential in determining the success of the message. Thus, in future designs, it is important to ensure that these message components are incorporated in the design.

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