

Who Are We Scaring With High Fear Road Safety Advertising Campaigns?

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Abstract

Despite decades of research with mixed results, fear-based public health campaigns continue to be extensively used around the world. This study examined the impact of a fear-based advertising campaign targeted at reducing unsafe driving behaviour and fatal accident rates in New Zealand. We argued that a campaign that used a strong appeal to the emotion of fear would be effective but only among some segments of the population. Using Poisson regression models, we found that fatal accident rates had been reduced among three groups of drivers: female drivers aged between 15 and 24, female drivers aged between 25 and 34, and male drivers aged between 35 and 54. However, the fatal crash rate of the main target audience of the campaign, young male drivers, has not been affected.

Keywords: Fear appeals, Poisson regression, advertising, market segmentation, road safety

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1. Introduction

Traffic accidents have long been among the leading causes of deaths in industrial societies (Peltzman, 1975; Kenkel, 1993). Whether these traffic accidents are the result of drunk driving (commonly known as Driving Under Influence or DUI in America), speeding, or other unsafe driving behaviours, the injuries and fatalities that often result are devastating and can inflict tremendous costs on both the individuals involved and society. In 1994, there were 580 fatalities and 16,600 injuries resulting from traffic accidents in New Zealand (LTSA, 2001), and the corresponding annual social cost is estimated to be NZ\$3 billion (LTSA, 1996).

In an effort to reduce the road toll in New Zealand, the Land Transport Safety Authority (LTSA) initiated a Supplementary Road Safety Package (SRSP) in October 1995. The SRSP was modelled after a similar campaign in the Australian state of Victoria which contributed to reductions of around 50% of the road fatalities and 40% of the serious injuries in the three year period from 1989 to 1992 (Cameron et al., 1993). Similarly, the LTSA had set a target for the New Zealand SRSP of a reduction of 80 fatalities, 450 serious injuries and 1600 minor injuries over a four year period.

Although the complete SRSP involves the use of speed cameras, advanced laser speed detectors and compulsory breath testing (CBT) (Cameron and Vulcan, 1998), the major component (budget-wise) of the package is the use of sustained publicity to support the speed camera and CBT tools. This publicity has taken the form of a paid advertising campaign primarily aired on television and focused on the drunk-driving and speeding themes. The advertising campaign was estimated to cost about NZ\$7 million in the first year and was subsequently increased to NZ\$9.8 million per year (Marketing, 1998). It therefore constitutes a very substantial portion of the total four year SRSP budget of NZ\$50.06 million (Cameron and Vulcan, 1998).

The primary appeal used in the SRSP television advertising campaign has been the appeal to the emotion of fear, highlighting the consequences of unsafe driving behaviour in an extremely graphic and shocking manner. Due to the realistic and highly graphic nature of these advertisements, it could be argued that this campaign uses a strong appeal to the emotion of fear. By implying some sort of threat or danger which evokes the emotional response of fear, advertisers and public policy makers can influence behaviour by showing individuals ways of coping with the threat and thus removing the danger (Tanner et al., 1991). A good deal of public debate, however, has arisen regarding the effectiveness and appropriateness of an advertising campaign that uses such a strong appeal to fear (Falconer, 1996; Gregg, 1996; Kearnes, 1996; Jones, 1998; O'Hanlon, 1998; Keene and Taylor, 1998; Turner, 1998).

Given the seriousness of this issue and the total cost of the campaign, it is crucial that the campaign be evaluated in terms of its effectiveness in reaching its goals. Even though a number of studies have been conducted to examine the effectiveness of the campaign, no consistent conclusion can be drawn from these studies. For instance, Macpherson and Lewis (1996; 1998) indicated that their study provided no evidence to suggest that the LTSA advertising campaign had any substantial effects on drunk driving behaviour (drink driving offence rate) and White (2000) found no significant effects on the number of serious crashes. Other researchers, however, found the advertising campaign to exhibit significant negative relationships with road fatalities and morbidity (Cameron and Vulcan, 1998; Tay 2001) and drink driving offence rates (Tay, 1999).

The purpose of this research is to evaluate the effectiveness of the LTSA advertising campaign on fatal accident rates, related to alcohol, drugs and speed, in New Zealand. This research differs from previous efforts in that it examines the effectiveness of the campaign on fatal accident rates among different segments of drivers in New Zealand. This approach is

justified given that previous researchers have found that fear appeals are more effectively used with certain groups and not the entire population (Higbee, 1969; Burnett and Oliver 1979; Burnett and Wilkes 1980; King and Reid, 1990; Quinn et al. 1992; LaTour and Rotfeld, 1997).

In addition, it utilises the Poisson regression model instead of the standard regression model used by Macpherson and Lewis (1998), Cameron and Vulcan (1998), Tay (1999, 2000) and White (2000) which assumes that the accident rates are continuous and normally distributed. However, since accident rates are discrete variables and are more likely to have a Poisson distribution (Nicholosn, 1985; Nicholson and Wong, 1993; Michener and Tighe, 1992; Hauer, 1997), the use of standard regression models will result in inefficient, inconsistent and biased estimates (Maddala, 1983; Greene, 1997).

2. The New Zealand Advertising Campaign

Adopted in October 1995, the SRSP essentially relies on significantly increased law enforcement activities supported by "hard-hitting, high-profile advertising" (LTSA, 1998a). Its aims are to achieve a widespread change in drivers' attitudes and behaviour, both in the short and the long term, and an absolute drop in the road toll (LTSA, 1998a). In order to achieve the objectives, the campaign uses:

"emotion and shock to deliver messages to audiences in a way that leaves drivers thinking 'it could be me' or 'I don't want to do that to someone.' The advertising is designed to engage people's core fears and vulnerabilities. In achieving this, the use of absolute realism is vital." (LTSA, 1998a)

Television is the primary media type used in the campaign because it is considered the most effective way to deliver strong, emotive and realistic road safety messages to New Zealand homes (LTSA, 1998a).

Judging from the sample of the advertisements described in Table 1, it is obvious that the LTSA advertising campaign uses a strong appeal to the emotion of fear to bring about a widespread change in people's attitudes and behaviour on the road. In fact, Rotfeld (1999) argues that the SRSP campaign features a very strong appeal to audience fears by showing the deadly outcomes from driving at excessive speeds or drunk driving.

[insert Table 1 about here]

Speeding and drunk driving are two of the biggest contributing factors to the road toll in New Zealand. For example, drunk driving was considered to be a major contributing factor in 38.4% of the road deaths in 1994 and 28.3% of the road toll in 1998, while speed was implicated in 39.3% of all road fatalities in 1994 and 32.1% in 1998 (LTSA, 1999). Consequently, the main emphases of the road safety advertising campaign are excessive speed and drunk driving (see Table 1).

In a public opinion survey conducted in 1995, 50% of drivers believed there was a low risk of being caught drunk driving, and 42% of male drivers admitted to having driven while at least slightly intoxicated in the previous year (LTSA, 1998b). Thus, the approach used in the messages relating to alcohol, attempts to highlight the link between drunk driving and road crashes. It achieves this linkage by presenting drunk driving as socially unacceptable and by stimulating social pressure and intolerance to support this position. The aim of the alcohol related messages is to bring about a widespread change in attitudes and behaviour and a consequent reduction in road trauma caused by drunk driving (LTSA, 1998b). The alcohol-related messages use the overall theme of "if you drink then drive, you're a bloody idiot" and are targeted at male drivers who account for 84% of the alcohol-related crashes. Among the male drivers, the main focus is on those between the ages of 18 and 24 because they are especially at risk (LTSA, 1998b).

In addition to the alcohol-related messages, the other key priority of the advertising campaign is speed-related messages. The approach used by the speed related messages is to convince people that speed is an important road safety issue and educate them about the dangers of excessive speed. The objective of these messages is to bring about a widespread change in people's attitudes and behaviour on the road, leading to a reduction in road trauma caused by excessive speed (LTSA, 1998b). These messages use the overall theme of "the faster you go the bigger the mess." Most (80%) of the speeding drivers are males and the worst offenders are in the 18 - 21 year old group, and males aged 18 - 24 years are responsible for 24% of all fatal and serious injury crashes involving a speeding driver (LTSA, 1998b). Therefore, males aged 18 - 24 again form the main target audience of these messages (LTSA, 1998b).

Some researchers have argued that the fear appeal approach used in the New Zealand advertising campaign was not an effective method to change behaviour and reduce road fatalities (Macpherson and Lewis 1996; 1998; Rotfeld 1999). For instance, Rotfeld (1999) argued that by focusing on advertisements of death and destruction instead of raising the threat of law enforcement, the New Zealand government's misdirected efforts became an example of misplaced social marketing.

Other researchers, however, have found evidence that the advertising campaign in New Zealand was effective (Cameron and Vulcan, 1998; Tay, 1999). Shore and Gray (1999) examined New Zealand teenagers' reactions to anti-drunk driving fear appeals and concluded that "it appears graphic anti-drink driving ads showing physical threats may still be the best way to influence teenagers". The differences in the evaluation of the campaign can be partly explained by the differences in the data and methodologies used, but, more importantly, we argue that the fear appeal campaign has been effective but only among certain segments of New Zealand society.

3. The Use of Fear Appeals

Over the past five decades, a great deal of research has been conducted on the use of the fear appeal in advertising. However, even after this prolonged period of investigation, research in this area can still be described as confused and confusing (LaTour et al., 1996; LaTour and Zahra, 1988; Severson et al., 1993; Tanner et al., 1991). As explained by LaTour and Rotfeld (1997), part of the confusion has arisen because of a failure to distinguish between threats, fear appeals, and fear arousal. LaTour and Rotfeld (1997) attempt to clarify this confusion by explaining that a threat is an appeal to fear, or a communication stimulus that attempts to evoke a fear response by showing some type of outcome that the audience wants to avoid. Fear is an actual emotional response to the threat that can impel changes in attitude or behavioural intentions, such as a change in the attitude towards drunk driving, and an actual change in consumer behaviour such as a reduction in speeding (LaTour and Rotfeld, 1997).

Although much of the confusion in the literature arose because of the failure to distinguish between different types of threats, some of the confusion could be attributed to the failure to differentiate between subjects (Higbee, 1969; LaTour and Rotfeld, 1997). No threat evokes the same response from all people. Given the same threat, one would expect different people to experience different levels of fear arousal. This proposition is based on an extensive body of past research (Higbee, 1969; Burnett and Oliver 1979; Burnett and Wilkes 1980; King and Reid, 1990; Quinn et al. 1992; LaTour and Rotfeld, 1997).

In a review of earlier literature, Higbee (1969) suggested that differences in personality characteristics, such as self-esteem, coping-style, perceived vulnerability and anxiety level, have a significant moderating effect on fear appeal. Besides personality characteristics, Higbee (1969) also suggested other groups of moderating factors that should

be considered in understanding the effect of the appeal to the emotion of fear. Of these other factors, two are particularly pertinent to this study: the age and gender of the subjects.

This study has chosen to focus on these two characteristics because they are the characteristics used by policy makers responsible for the SRSP campaign to define the target audience. Unfortunately, most of the previous research on fear arousal was conducted on personality, attitudinal or psychological characteristics and very few studies have examined the effects of demographic characteristics (Higbee, 1969; Burnett and Oliver, 1979). Therefore, there is insufficient previous evidence that can be used to directly evaluate the expected effectiveness of the SRSP campaign on the different demographic segments.

In one of the few studies that explicitly examined the relationship between fear appeal and demographic characteristics, Quinn et al. (1992) found that secondary school students experienced a significantly higher level of fear than the postgraduate students when they were exposed to the same threat (cancer from smoking). The authors attributed this difference to younger students (secondary school students) being more impressionable. Although this result may not be directly applicable to our study because our subjects are much older, they do suggest that subjects of different age do respond differently to the same threat.

Quinn et al. (1992) also found that female students experienced a higher level of fear arousal than their male counterparts in a survey on the health consequences of smoking. The authors attributed this difference to the "bravery of 'machismo' belief that they (males) are not vulnerable". The result clearly showed that the same threat could produce different results in male and female subjects.

Burnett and Oliver (1979) provide more evidence to support the effectiveness of a segmentation approach. Their research investigated the response to a Health Promotion Organisation (HMO) promotion and utilised both sociopsychological and demographic variables to segment the sample. Unfortunately, cluster analysis was also performed and thus

the influence of individual demographic determinants was confounded. Furthermore, the authors did not relate the different clusters to the level of response. The basic conclusion emerging from their study was that the facilitating effect of fear seems to be somewhat different when viewed on a segment-by-segment basis.

In another study, Burnett and Wilkes (1980) used a segmentation approach to examine the use of fear appeal to stimulate membership in a Health Maintenance Organisation (HMO). They found that only two of the demographic clusters, 'older blue collar whites' and 'older blue collar blacks' manifested consistent relationships between fear levels and attitudinal measures. The target groups appeared to be the older respondent (average age of 49 compared to 35 for the non-responsive groups) with lower income (mean of \$9,000-\$10,000 compared to a mean of \$21,000 for the others). However, no attempt was made to explain these results.

Our review of the literature suggests that there is a lack of research on the relationship between fear appeal and demographic characteristics. Furthermore, among the few studies that did examine this relationship, none were conducted in the area of road safety. As suggested by Higbee (1969), some of the inconsistencies in previous findings can be attributed to the diversity of topics examined. Therefore, a re-examination of this relationship using the SRSP campaign will contribute significantly to the existing body of knowledge.

In addition, most of the previous studies surveyed were conducted using some psychological, emotional or attitudinal measures as the response variable. However, the performance measures stipulated by the LTSA are the number of fatalities, serious injuries and minor injuries that arose from road crashes. Although attitudes and intentions may be a good predictor of behavioural outcomes, they are not perfect predictors. Hence, by examining the actual target outcomes, this study will provide a better evaluation of the effectiveness of

the public health campaign. Furthermore, these performance measures are also easier to measure than attitudes and intentions of the subjects.

4. Research Hypotheses

Based on the results of previous research and the preceding discussion, two general hypotheses will be examined in this study. First, the SRSP advertising campaign will be effective only on some segments of the population. Second, relative to the other segments of the population, the SRSP advertising campaign will be more effective in reducing the accident rates among young male (18 - 24 year old) drivers who form the main target audience.

5. The Empirical Model

In order to test the above hypotheses, we need to evaluate the effectiveness of the advertising campaign on various segments of the population. To evaluate the effectiveness of the advertising campaign, some suitable measures of performance have to be selected. The publicly stated objectives of the campaign are "to save 80 lives, 450 serious injuries, and 1,600 minor injuries over a four year period" (O'Hanlon, 1998). These three measures should be the obvious choices for evaluating the performance of the campaign. This research, however, will focus only on the number of fatal accidents because of its better reporting rate. Specifically, the dependent variable Y is the number of fatal accidents in New Zealand that have been attributed to alcohol, drugs or speed and is assumed to satisfy the following function:

$$[1] \quad Y = f(\text{Vehicles}, \text{Unemployed}, \text{CBT}, \text{Camera}, \text{Advert})$$

where Vehicles is the number of registered vehicles on the road

Unemployed is the number of unemployed persons
CBT is a dichotomous variable for the compulsory breath testing program
Camera is a dichotomous variable for the speed camera program
Advert is a dichotomous variable for the advertising campaign

It should be pointed out that the choice between all fatal accidents and fatal accidents attributed to the alcohol, drugs or speed is a difficult one. Most researchers use or recommend the use of alcohol-related accidents as the appropriate measure to reduce the confounding effects of other factors (Asch and Levy, 1987; Saffer and Chaloupka, 1989; McCarthy and Ziliak, 1990). Using this measure, however, may neglect the substitution or spill over effect on non-alcohol related accidents. As pointed out by Hauer (1997), due to the treatment (advertising campaign in our study), the subjects in the study may drink and drive less and drive sober more. Owing to this change in the relative exposure rates, the probability of having an alcohol-related accident is expected to decrease but the probability of having a non-alcohol-related accident is expected to increase. Therefore, using alcohol-related accidents as a measure of performance may produce an overestimate of the overall impact of the treatment as it ignores the perverse effects it may have on non-alcohol-related accidents.

The main independent variable examined in this study is the SRSP advertising campaign. Although a suitable measure of advertising exposure such as advertising expenditure, target audience rating points, duration and frequency of advertisements, would be preferred, reliable data are not available for any of these measures. Therefore, a dichotomous variable, *Advert*, will be used to differentiate the data before (*Advert*=0) and after (*Advert*=1) the introduction of the SRSP advertising campaign in October 1995. If the campaign is effective, then the estimated coefficient for this variable will be negative and significant.

To properly examine the effectiveness of the advertising campaign, we need to isolate its impact from other influences. During the period under study, two other components of the

SRSP were also introduced and these have to be appropriately controlled for. First, compulsory breath testing was introduced in April 1993 and its effect will be captured by another dichotomous variable *CBT*. Second, speed cameras became operational in New Zealand in October 1993 and this change in enforcement will be captured by an dichotomous variable denoted by *Camera*. Since these measures were designed to improve road safety, they are expected to have a negative coefficient.

Also, an increase in traffic activity and exposure will increase the likelihood of observing more accidents. Common measures used in the literature to capture this influence include vehicle kilometres travelled, number of registered vehicles and gasoline sales (Smeed, 1949; Andreassen, 1991; Peltzman, 1975; Michener and Tighe, 1992). Unfortunately, no reliable data are available in New Zealand for vehicle kilometres travelled, but the number of registered vehicles (*Vehicles*) is well recorded by Statistics New Zealand and will be used in our study. This variable is expected to have a positive coefficient.

The level of income or economic activity has been widely found in literature to have a significant effect on road accidents (Zlatopher, 1984; Shaffer and Chaloupka, 1989; Muller, 1989; McCarthy and Ziliak, 1990; Ruhm, 1994). Consistent with most of these studies, a measure of unemployment rate, the number of unemployed, will be used in our study and is represented by the variable *Unemployed*. As an increase in the number of unemployed will reduce the level of economic activity, this variable is expected to have a negative effect on the number of road accidents.

6. Research Methodology

Previous empirical research examining the effectiveness of road safety advertising campaigns has primarily used linear regression models or ANOVA to analyze the data (Berkowitz and Cottingham, 1960; Leventhal and Niles, 1965; Kohn et al., 1982; King and

Reid, 1990; Cameron et al., 1993; Fry, 1994; Macpherson and Lewis, 1996; 1998; Cameron and Vulcan, 1998; Tay, 1999). The common assumption in these types of research is that the dependent variable or the error term is continuous and has a normal distribution.

However, accident rates are discrete variables and are more likely to have a Poisson distribution rather a normal distribution (Nicholson, 1985; Nicholson and Wong, 1993; Michener and Tighe, 1992; Hauer, 1997) and the use of techniques assuming a normal distribution can result in inefficient, inconsistent and biased estimates (Maddala, 1983; Greene, 1997; Long, 1997). Further developments in econometric techniques such as the Poisson and Negative Binomial regression models have provided researchers with more appropriate methods of analysis and have recently been used by Michener and Tighe (1992) and Brannas (1995). Since the dependent variable in our study is the number of fatal accidents per month, the Poisson regression model will be adopted in this research.

The number of fatal accidents per month, Y , is assumed to be Poisson distributed with the parameter λ and is governed by the following equation:

$$[2] \quad \text{Prob}(Y = y) = \frac{e^{-\lambda} \lambda^y}{y!} \quad \text{for } y = 0, 1, 2, 3, \dots$$

The parameter λ is the expected number of accidents and is hypothesized to be related to a vector of explanatory variables X . The most common formulation for λ is the log-linear form (Greene, 1997) given by:

$$[3] \quad \ln \lambda = \beta X$$

where β is a vector of parameters to be estimated. The above model will be estimated using the maximum likelihood technique which yields estimates that are asymptotically normal, unbiased, efficient and consistent (Kennedy, 1992; Greene, 1997).

The marginal effects of explanatory variables on the expected number of accidents can be obtained from the partial derivative of $E(Y)$ with respect to X .

$$[4] \quad \frac{\partial E[Y | X]}{\partial X} = \lambda \beta$$

This measure is usually computed using the mean values of the explanatory variables and parameter estimates.

Of special interest to this study is the case where the explanatory variable is dichotomous. For example, $Advert = 0$ before the implementation of the SRSP campaign and $Advert = 1$ after the implementation of the campaign. The marginal effect of the campaign can be obtained by computing the difference between the expected number of accidents, λ , when $Advert = 1$ and $Advert = 0$, with all other independent variables held at their mean values. In particular, the percentage change in the expected number of accidents that may be attributed to the campaign can be calculated from:

$$[5] \quad 100[\exp(\beta_{Advert}) - 1]\%$$

where (β_{Advert}) is the estimated coefficient for the dichotomous variable representing the advertising campaign.

Central to our analysis is the hypothesis that the effectiveness of the fear appeal campaign in moderating the behaviour of drivers is dependent on the segment of the

audience. To test this hypothesis, separate models will be estimated for different sex and age groups. Specifically, four models will be estimated for male drivers between the ages of 15-24, 25-34, 35-54 and those above 55. The corresponding four models will be also be estimated for female drivers.

7. Data

The primary data used in this study were provided by LTSA from their Accident Investigation System (AIS) which gathers information on all reported accidents. Even though it is the most reliable source available, it nevertheless has some deficiencies. First, as the crash reports were filed by the local police officers, some inconsistencies may exist in their reporting (Figlio, 1995). This issue is especially relevant for alcohol related accidents because some officers are more likely than others to indicate the involvement of alcohol as a contributing factor in an accident. Second, some accidents will involve drivers, especially non-residents of New Zealand, who have not been exposed to the advertising campaign.

The number of fatal crashes per month was compiled from the AIS database for the period between January 1988 and December 1996 to produce a time series with 108 observations. Table 2 provides the summary statistics for the number of fatal accidents, before and after the implementation of the advertising campaign, for the different segments examined in this study. With the exception of male drivers above the age of 55, there appears to be a decrease in the number of fatal accidents in all other segments. Male drivers between 15 and 24 years old registered the largest decrease from an average of 10.33 fatal accidents per month to 6.93 fatal accidents per month. Although smaller in absolute terms, the percentage decreases among female drivers are relatively large, ranging from 26.2% for drivers above 55 years old to 56.6% for drivers between 25 and 34 years old.

[insert Table 2 about here]

Table 3 presents the summary statistics for all the explanatory variables used in our models. Secondary data on the number of registered vehicles and the number of unemployed persons are compiled from data published by Statistics New Zealand (various years). The main explanatory variable for the Poisson regression models is the LTSA safe driving advertising campaign that began in October of 1995. Therefore, the intervention variable, *Advert*, will be equal to zero for the series from January 1988 to September 1995 (93 observations) and will be equal to one for the series from October 1995 to December 1996 (15 observations). The other two policy variables, *CBT* and *Camera*, will have respectively 63 and 69 observations before and 45 and 39 observations after their implementations.

[insert Table 3 about here]

8. Results

The estimation results for all eight models are reported in Table 4. Only five of the eight models had significant explanatory power. The models for female drivers above the age of 34 and male drivers above the age of 64 fitted the data poorly. In short, the variations in the number of fatal road crashes experienced by these drivers cannot be explained by the independent variable used. More importantly, these drivers do not appear to be affected by any of the advertising, camera speed or compulsory breath-testing campaigns. This result is not particularly surprising since they have not been the target subjects in any of the campaigns.

[insert Table 4 about here]

Among the models with significant explanatory powers, younger female drivers were found to have a lower fatal crash rate whereas younger male drivers experienced a higher fatal crash rate, relative to the middle aged male drivers. This result provides further evidence

that young male drivers are relatively more risky and they should be the target subjects in most of the LTSA road safety programs.

More importantly, the effects of the various road safety policies on road safety are mixed. The speed camera program did not appear to be effective on any group of drivers whereas the compulsory breath-testing program was found to significantly reduce only the number of fatal crashes involving male drivers between the ages of 25 and 34. The number of fatal crashes involving drivers from this group was estimated to decrease by 33.95% due to the CBT program. Translated into actual numbers, the CBT can be attributed to a decrease of about 2.64 fatal crashes per month.

The biggest surprise, nevertheless, was on the estimated impact of the advertising campaign, which is the main focus of this research. The advertising campaign was found to have no effect on its main target audience, the young male drivers. It is, however, effective in reducing the number of fatal crashes experienced by young female drivers and middle-aged male drivers. The estimated percentage decreases among the three groups are 29.91% for male drivers between the ages of 35 and 54, 40.21% for female drivers between the ages of 15 and 24 and 70.04% for female drivers between the ages of 25 and 34. In terms of absolute numbers, these decreases translate into 2.09, 0.77 and 1.19 fatal crashes per month respectively. Although the exact of number of lives save is difficult to predict due to confounding factors discussed below, the target reduction of 80 lives over 4 years is likely to be achieved if the present trend is maintained.

It should be noted that the gross effect of the advertising campaign is less than the sum of the individual effects on each segment because of the possible overlapping in the accident count among the various segments as some accidents involve drivers from more than one segment. Therefore, the expected total reduction in the number of fatal crashes per month from the advertising campaign is estimated to be between 2.09 (largest of the three segments)

and 4.05 (sum of all three segments) which is likely to be larger than that achieved by the CBT program. In addition, this examined the impact of the advertising campaign on the number of fatal crashes and not the number of fatalities, which is expected to be larger since there may be multiple fatalities in some crashes.

9. Discussion

Since the inception of the anti-drunk driving advertising campaign, there has been considerable debate regarding the appropriateness and effectiveness of such a graphic and hard hitting approach that relies upon a strong appeal to the emotion of fear. Even though a number of studies have been conducted to examine the effectiveness of the campaign, no consistent conclusion can be drawn from these studies. However, given the seriousness of this issue and the total cost of the campaign, it is still crucial that the campaign be evaluated in terms of its effectiveness in reaching its goal of reducing total road fatalities in New Zealand.

To achieve its goal, the LTSA has focused a large proportion of its campaign on young male drivers, especially those between the ages of 18 and 24. Unfortunately, most of the previous research on social marketing of public health has focused on the relationship between fear arousal and psychological attributes of the audience. The difference in the concept and measures used in research and those used by public policy creates an important gap between theory and practice. This research provides a small but significant bridge in the gap by examining the effectiveness of the campaign on fatal accident rates among different demographic segments of drivers in New Zealand.

This approach is justified given that previous researchers have found that fear appeals will not evoke the same response from all segments of a population. Thus, we would not expect the behaviour of all drivers in New Zealand to be changed by the graphic approach

being utilised in the LTSA advertisements. Given that the LTSA has primarily targeted this campaign at the young male driver, we have hypothesised that young male drivers will be affected by this campaign more than drivers in other segments of the population. As a consequence, we have expected that the fatal accident rates among this group will be reduced by a greater extent.

Our results provide some evidence to support the hypothesis that an advertising campaign based on an appeal to the emotion of fear will not have the same impact or achieve the same results with all segments of a population. The LTSA advertising campaign was found to reach its goal of reducing road fatalities in only three of the eight demographic groups: two groups of female drivers, aged from 15 - 24 and 25 - 34, and one group of male drivers aged from 35 - 54.

Unfortunately, our main hypothesis could not be supported by the results of our empirical models. Although the LTSA has directly targeted the advertising campaign at young male drivers, aged 18 - 24, the fear appeal approach has not been successful with this segment, with no reductions in fatal accident rates among this group. This implies that the advertising campaign is effective in reducing the number of fatal crashes but the reduction did not come from the main target audience of the campaign.

10. Policy Implications

It appeared that the policy makers have chosen to use the "common sense" approach and ignored the vast body of research on the use of fear appeals as a marketing tool. In its effort to target the young male drivers, the policy makers have chosen to focus the "commercials of death" on increasing the perceived vulnerability of this group of drivers by making the advertisements more relevant and realistic to them. However, extensive research

in the past has cast doubts on the success of using a high level of fear appeal in a social marketing campaign with these features.

These findings suggest the need for still more research into the use of the fear appeal in advertising. Based on our results and the findings of others, it seems safe to conclude that an appeal to the emotion of fear will evoke different responses from different segments of an audience. Thus, segmenting target consumers by demographic and/or psychographic characteristics appears to be a definite prerequisite in the use of the fear appeals. Having selected target audience, policy makers should carefully review the research literature to assist them in designing their campaigns; otherwise, the campaign can easily be misplaced even when using a "common sense" approach, as demonstrated by the SRSP campaign.

Public policy makers should also realise that a single behavioural change strategy, such as a fear appeal advertising campaign, cannot be utilised with all segments of a population and that there is a need to consider separate strategies for different groups. For example, the CBT campaign was found to be effective on male drivers between the ages of 25 and 34. This result suggests that an advertising campaign targeted at young male drivers may be more effective if it focuses on alternate messages, such as the threat of enforcement instead. This approach is consistent with the recommendations made by Rotfeld (1999).

Although not the primary focus of this research, the other policy interventions of the SPSP were also examined in our models. The speed camera program was not effective among any group of New Zealand drivers, whereas the compulsory breath-testing program was only found to be successful in reducing the number of fatal crashes involving male drivers between the age of 25 and 34. These results enable us to make a comparison of the three SRSP policy tools. The advertising campaign is still the most effective of the three policy interventions examined in this study, having reduced fatal accident rates among three segments of drivers with a combined expected reduction that is likely to be more than the

expected reduction from the CBT program. However, since insufficient cost data are available to compute their relative cost-benefit ratios, we cannot conclude that the advertising campaign is the most cost-effective countermeasure.

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Table 1
Sample of Advertisements

Behaviour of Interest	Theme
Speeding	A man driving too fast in a residential area runs over a little girl, who is chasing her ball into the street. We hear his voice saying, "I can't get it out of my head, she was only 4 and I killed her," and the image of the little girl being hit is shown over and over again.
Drink Driving	A family in a speeding car tries to avoid a construction site and hit a telephone pole. The mother and one daughter die instantly. The message focuses on the father whose pain and grief "have only just begun." The last image we see is of the mother's bloody body.
Drink Driving	A drunken man driving on a country road at night, rolls his car into a dry riverbed. As the river level rises, we hear the man, who is trapped in his car, screaming for help. In the morning, we see that water has covered the car, and all we hear is silence.
Speeding & Drink Driving	A group of drunken youths, driving too fast, crash their car into a tunnel wall. The driver survives but watches his mates die.
Drink Driving	A group of drunken youths roll their car into a ditch. The driver escapes the car but cannot free his friends, who are burned to death when the car explodes into flames.
Seat Belt Usage	A family returning from a fishing trip wrecks their car to avoid an oncoming vehicle. The father and two of the children, who are not wearing their seat belt, die, but two other children, who are properly belted in, survive. The last image is of the remaining family gathered around the graves.

Table 2
Fatal Accidents Before and After Implementation of Campaign

	Before Campaign		After Campaign	
	<u>Mean</u>	<u>Std Dev</u>	<u>Mean</u>	<u>Std Dev</u>
<u>Male</u>				
15-24 yrs olds	10.33	3.55	6.93	2.19
25-34 yrs olds	7.77	3.33	5.73	2.43
35-54 yrs olds	6.98	2.88	5.20	2.18
55 yrs or older	1.91	1.37	2.00	1.13
<u>Female</u>				
15-24 yrs olds	1.91	1.40	1.27	1.03
25-34 yrs olds	1.69	1.34	0.73	0.96
35-54 yrs olds	1.63	1.36	1.07	1.03
55 yrs or older	0.45	0.60	0.33	0.49

Table 3
Summary Statistics for Explanatory Variables

<u>Variables</u>	Before Campaign		After Campaign	
	<u>Mean</u>	<u>Std Dev</u>	<u>Mean</u>	<u>Std Dev</u>
Vehicles (thousand)	232.46	9.04	245.54	1.70
Unemployed (thousand)	174.40	33.21	153.43	6.21
CBT	0.32	0.47	1.00	0.00
Camera	0.26	0.44	1.00	0.00

Note: Since the advertising campaign was implemented after the compulsory breath testing and speed camera programs, all values of the two former programs in the after period are equal to one.

Table 4
Estimation Results

Segments	Male 15-24	Male 25-34	Male 35-54	Male 65-99	Female 15-24	Female 25-34	Female 35-54	Female 65-99
No. of Obs.	108	108	108	108	108	108	108	108
Chi-Square	32.2709	25.6213	9.6273	3.6292	12.0534	15.9116	7.48857	1.8102
Deg. Freedom	5	5	5	5	5	5	5	5
Significance	0.00005	0.00011	0.08651	0.60392	0.03406	0.00710	0.18677	0.87472
Variables								
Intercept	5.73351*** (3.495)	3.5378* (1.889)	-0.13723 (-0.069)	-0.05283 (-0.014)	-6.43515 * (-1.673)	-8.33996** (-2.030)	6.46761 (1.605)	-6.52509 (-0.818)
Vehicles	-0.01496* (-1.863)	-0.00494 (-0.539)	0.01093 (1.130)	0.00622 (0.339)	0.037185** (1.982)	0.04413** (2.224)	-0.02738 (-1.390)	0.02714 (0.700)
Unemployed	0.00413 (0.271)	-0.00168 (-0.967)	-0.00231 (-1.264)	-0.00395 (-1.126)	-0.00779** (-2.173)	-0.00744** (-1.988)	0.00173 (0.463)	-0.00223 (-0.308)
CBT	0.00494 (0.035)	-0.41482** (-2.134)	-0.19163 (-1.047)	-0.30189 (-0.797)	-0.54429 (-1.360)	-0.09607 (-0.264)	-0.38416 (-0.883)	-0.49697 (-0.661)
Camera	-0.00517 (-0.029)	0.29446 (1.266)	0.00258 (0.011)	0.12028 (0.262)	-0.20851 (-0.426)	-0.34678 (-0.756)	0.75582 (1.503)	-0.17661 (-0.188)
Advert	-0.18651 (-1.424)	-0.20000 (-1.380)	-0.35532** (-2.389)	0.00510 (0.020)	-0.51436* (-1.744)	-1.2257*** (-3.508)	-0.31872 (-0.979)	-0.22196 (-0.370)

Note: t-statistics are reported in the lines below the estimated coefficients.

*, ** and *** denote statistically significant at $\alpha = 0.10, 0.05$ and 0.01 levels respectively.

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