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Title and Subtitle

Road Safety Mass Media Campaigns: A Meta Analysis

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Abstract

This report details the use of a scientific approach to synthesize the results of a large number (87) of ***evaluated*** road safety mass media campaigns. The approach adopted involved the use of Meta Analysis techniques which provides a means of reconciling conflicting findings and allows for a more rigorous approach to synthesis by statistically attempting to develop generalisations across all categories of interest. The analysis found that the average impact across all campaingns and all outcome measures combined (awareness, knowledge,attitudes, behaviour) was 7.56%. (i.e. a campaign is expected to achieve an improvement of 7.56% on the pre campaign measure.) A range of other key findings relating to the effectiveness of various campaign types and strategies is also documented. It is hoped that the findings from this study can be used to encourage new mass media campaigns to be developed on the basis of the lessons learnt from previous campaigns.

Keywords

Mass Media Campaigns, Meta Analysis, Public Education

ROAD SAFETY MASS MEDIA CAMPAIGNS:

A META ANALYSIS

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Table of Contents

Executive Summary

Mass media campaigns are commonly used in road safety. In Australia, they are likely to be carried out as a support for or be supported by other activities (eg., enforcement). The advertising industry may have a belief in the powerful effects of paid mass media messages. Road safety authorities are more likely to believe mass media needs the support of other more persuasive counter measures. The Federal Office of Road Safety (FORS) has, for many years, been interested in encouraging the development of mass media campaign based upon what can be learnt from previous campaigns.

A limited number of reviews of mass media road safety campaigns are available. These reviews are subjective and make generalisations on the basis of mass media literature or psychological literature with reference to a limited number of specific campaigns.

FORS believes that a more systematic synthesis of knowledge is needed if greater progress is to be made in the future. The current state-of-the-art of review synthesis recognises that the most scientific way of establishing what is known is to conduct a "Meta-Analysis".

Any traditional review and analysis of road safety campaigns would reveal inconsistent results. Meta-analysis provides a means of reconciling conflicting findings. The meta-analytic technique (Glass 1976) used in this report represents a comprehensive scientific approach to aggregating a large number of studies of campaigns, and their results, so as to make several generalisations as to what differentiates successful from unsuccessful campaigns.

Meta-analysis involves four stages:

- using objective methods to find campaigns for review,
- describing the features of the campaigns in quantitative terms,
- expressing the results of the campaigns on a common scale of effect size, and
- using statistical techniques to relate campaign features to campaign results.

Eighty-seven evaluated road safety mass media campaigns were included in the meta-analysis. Hundreds more were identified and details obtained. Virtually all of those excluded did not involve any form of evaluation or else failed to establish a base line (before) measure.

To be included in the meta-analysis the campaign had to have been evaluated in some scientific form (ie, able to calculate an effect size because of 'before' versus 'after' measures). Additionally, a campaign had to involve some form of mass media (eg, TV, radio, newspaper, brochures, pamphlets, etc.) and not be merely school-based. Finally, some evaluated campaigns were excluded because of lack of details available with respect to the campaign features.

The eighty-seven campaigns covered twenty years, mostly english speaking countries, and included more campaigns on restraint wearing and drink-driving than other road user behaviours. The effects (outcomes) measured by these evaluated campaigns ranged from simple awareness of campaign, to awareness of the issue, to knowledge about the issue, to attitude or intention, to behaviour (observed or self-reported).

Initially a total of one hundred and seventy five effect measures were calculated because, in some cases, multiple effect measures were available (eg., changes in attitudes and changes in behaviour). Some of the campaigns included the same campaign run in a second location where independent results were available. *The main analysis in the report is based upon 157 effect measures.* Eighteen effect sizes were excluded because they involved the same campaigns in different geographic locations or because only simple measures of awareness ('yes'- seen campaign etc) were available. The rationale for exclusion is included in section 4.52 - awareness effect size measures were roughly four times greater than for other outcome measures (knowledge, attitude or behaviour).

The characteristics of these campaigns in the aggregate is supplied in the report in section 4.1 and Appendix 3, and the individual outcome results in Appendix 4. In the aggregate, the following observations can be made:

- most campaigns are not evaluated or else use only a primitive non-scientific approach to evaluation (usually after measures only and frequently focussing on awareness of campaign);

- most campaigns are not published as case studies. Reports of campaigns, which are usually held by authorities, focus on evaluation and minimise the reporting of campaign characteristics;

- most campaigns are of short duration (less then 10 weeks);

- the orientation is usually that of providing information, although persuasion is often a goal;

- research is often undertaken prior to a campaign and during the development of a campaign;

- campaigns are especially likely to involve TV and/or radio/ and/or newspapers and be supported by publicity and legislation but not by enforcement;

- the media element is more likely to be continuous and multiple executions available; and

- messages are usually direct (at me), rational, use a one-sided argument, and are negative.

The main conclusions of the study are presented in Chapter 5 and can be summarised as follows:

1. Scientific evaluation is not the norm.

2. The standard of case study reporting of evaluated mass media campaigns leaves much to be desired.

3. The average (mean) effect size across all campaign outcome measures (including awareness, knowledge, behaviour change etc) was 7.56%; ie, a road safety campaign can, on average, expect to achieve a change in the pre-post measures of the order of 7.5%. When awareness improvements are excluded the average improvement is around 6.1%. (This is a world first: no one has ever indicated what ought to be expected).

4. This average campaign effect result varies considerably according to type of campaign outcome measure. For awareness, campaigns should achieve at least a 30% + change, for attitudes a 5% change, for intentions a 1% change, etc. (see sections 4.2 & 4.3 for details).

5. The base level upon which the campaign has to build also influences the level of change. Campaigns starting with a low base level can be expected to achieve a much greater change than those starting at a high base. If the base level is zero then a campaign should, on average, achieve a 9% increase on the pre measure of anything other than awareness. At the 50% base level the expected improvement is 6% and at the 80% level only a 4% improvement can be expected.

6. Campaigns with a deliberate persuasive intent are more effective than campaigns with an informative (educative) intent.

7. Campaigns which use a theoretical models are more effective, as are those which conduct prior research (qualitative and/or quantitative).

8. Campaigns which include publicity and/or enforcement are more effective.

9. Campaigns which use an emotional appeal are more effective than rational/informative approaches.

10. Campaigns which request/instruct a specific behaviour are more successful.

11. Campaigns which start with a lower base level (under 40% as a pre measure) have much more effect than those with high base levels).

12. Australia campaigns have been slightly more effective than US campaigns.

This report confirms statistically and somewhat more scientifically some of the generalisations found in traditional, more subjective, literature reviews by FORS (Elliott 1989, Elliott 1990). Even so, considerable limitations do exist in relation to the data and to the statistical analysis. Accordingly, this report represents "best-knowledge" to date. By far the greatest weakness is the inability to take account of campaign intensity in comparing campaigns and relating them to effect sizes and future efforts need to consider some means of identifying this campaign feature and attaching some numerical value to intensity.

About This Report

Meta-analysis is essentially a disciplined and statistical approach to the integration of knowledge. The report which follows, whilst technical, requires little detailed knowledge of statistics. The non-statistically inclined reader can largely ignore the statistics.

Chapter one provides a detailed background relating to mass media campaigns and the search for generalisations.

Chapter two outlines the general meta-analysis approach.

Chapter three discusses the application to road safety campaigns.

Chapter four represents the detailed meta-analysis including the detailed findings. This chapter represents the core of the report and by its very nature is a little technical.

Chapter five summarises the main conclusions derived from the analyses in chapter four.

The detailed results of each campaign and the calculation of effect sizes are included in the Appendices. The author has a copy of all the campaign details including the individual coding sheets. These were not included since each of the eighty seven campaigns each provided ten pages of coding sheets. All are available on request. Appendix 4 categorises the campaign summary statistics into restraints, drink-driving, general road safety (motorcycle, children, bike helmet, pedestrians, stop-signs, other, speeding). The references are listed in three separate sub sections in section 6 before the Appendices. The first list contains references used in the report in relation to the meta-analysis. This is followed by references to articles involving detailed reviews of road safety campaigns. The final set is a list of campaign sources.

The author wishes to acknowledge the efforts of Heather White in assisting in the coding and Bill Callaghan of RMIT for his invaluable assistance in the statistical calculations.

1.0 Background

1.1 Road Safety Persuasion in Australia

The Federal Office of Road Safety along with the various State road safety authorities recognise that getting people to adopt safe road behaviours is a complex persuasion task. Achievements, to date, have varied considerably depending on the specific road user behaviours and the nature of the targeted road user.

Mass media campaigns in road safety are commonplace in Australia and in many other countries. Two differing viewpoints characterise the approach to the development or use of mass media campaigns.

1.11 Viewpoint 1: An Indirect Supportive Role

Road safety authorities recognise the complexity of the persuasion task which they face. Most agree that getting people to do what we want them to do - ie. adopt and maintain safe road behaviours most (or all of) the time is no easy task. Notwithstanding the difficulty of the task, some road safety authorities develop strategies on the assumption that mass media campaigns are, by themselves, likely to a result in the widespread or lasting adoption of safe behaviours.

A Workshop on *Compliance and Enforcement* (see Travelsafe 1992) came to the consensus viewpoint that the greatest achievements in road safety in Australia have not occurred as a result of relying entirely on voluntary adoption of safe behaviours. High levels of safe behaviours have sometimes achieved more as a result of legislation, or safer environments. In these instances, strategies for achieving voluntary compliance ("do it because it's good for you" or "because it's good for others"), have been by-passed for more indirect or coercive strategies. In so doing, some experts have argued that the levels of compliance achieved are considerably greater than would have been the case if road users had merely been asked to adopt safe road user behaviours (Travelsafe 1992, para 6.14).

In essence, in Australia, some road safety authorities have not relied on mass media campaigns to bring about mass adoption of safe road behaviours. Rather, mass media campaigns have been used as a means of signposting the need to adopt safe behaviours. Such road safety authorities have intuitively and experientially believed that mass media of and by itself, is not a powerful force for changing individuals. It has a role to play - a somewhat limited role - which is gradually being defined over time (see reviews by Avery 1973; Elliott 1989; Elliott 1992; Vingilis & Coultes 1990). Mass media campaigns need to be viewed as an integral supportive element for other countermeasures - a signposting role. These other countermeasures are seen as essential such as legislation, enforcement, new technologies, safer road/vehicle environments, etc.

1.12 Viewpoint 2: A Direct (Powerful) Persuasive Role

Those who are charged with the task of making words/ pictures/ images/sounds (ie. advertising or mass media messages) are likely to act on a different set of assumptions. Agency people, in general (but not all), believe that advertising is a powerful force and that it can persuade people directly. The essential element in this belief is that "advertising sells" so long as it is creative enough (and people are exposed to it sufficiently often). This belief is understandable - it supports the advertising industry.

Whilst there are examples of advertising campaigns which clearly did sell the product or service very well, there is little evidence to support the view that advertising alone permanently changes targeted individuals.

There is a great deal of consensus with the viewpoint that the power of paid mass media messages is greatly exaggerated. This consensus emerges from mass media researchers such as: Comstock 1982; McGuire 1986; Lantos 1987; Atkin 1988; Rice & Atkin 1989; Budd & Ruben 1991, health promoters and educators (Wallack 1984; Blane 1988; Atkin & Wallack 1990).

In recent years a growing band of marketing academics (eg, Weilbacher 1987, Bell 1988; Drane 1988; Ehrenberg 1988; Peckman & Stewart 1988; Jones 1989, 1992) have been questioning the supposed "strong" effects of advertising and argued for the "weak" theory of advertising*.

The conclusion is that planned mass media messages (paid - advertising - a community service) are not powerful persuaders in general. However, under limited circumstances (not fully understood as yet) mass media messages can have an effect albeit usually limited. Today's generally accepted paradigm is one of *"powerful effects under limited conditions"* rather than past models of "powerful effects" or limited effects. **The challenge (for this report) is to define these limited conditions which may enhance the likelihood of powerful effects.**

Advertisers in contrast to their agencies, are acutely aware that advertising by itself is unlikely to result in sales - rather it is but one key element in the marketing process. Thus one of the key limiting conditions for product advertisers is support activities (eg. PR or sales promotion distribution, pricing, packaging etc).

1.2 Selling Road Safety Like Soap!

Advertising practitioners are not only likely to hold an exaggerated belief as to the likely effects of paid media messages, they simultaneously are likely to believe that *"you can sell brotherhood like soap"*. If does not matter, according to this view, what the product (service or idea) is, all that is required is creative advertising. The logical extension of this idea is that the *"same advertising principles apply no matter what"* (Henry 1979). Elliott (1987, 1991) has extensively argued and documented that the differences in advertising road safety versus products (or services) are real and are very significant. Failures to date reflect a failure to focus on critical differences which make these two persuasion tasks unique (Elliott 1991).

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* The interested reader can find a discussion in "Is Advertising a Strong or Weak Force" ch 3, in Jones (1992).

1.21 *Changing People or Taking Them as They Are?*

The notion that you can sell brotherhood like soap has many inherent assumptions about the persuasion task. Marketers mostly do not change people. Rather, marketers take people as they are and offer them what they desire. Marketers rarely create non-existent needs. They study on-going action and design an offering which chosen targets will find attractive. The persuasive message is *carry on* but *choose our offering*.

Road safety authorities usually have a different persuasion tasks. Instead of giving people what they want the persuasive message more likely to be *do not carry on* what you are doing because you like it but please change (*stop* or *start*) because its good for you and others (even if you don't like it).

Furthermore, if you don't do the right thing we will punish you. This contrasts with the marketer who rewards people by providing satisfaction. If satisfaction doesn't occur then there will be no repeat patronage.

In an honours masters thesis at the University of NSW, this author (Elliott, 1991) has argued that here is a very real distinction between what marketing does and what the road safety authority social advocate has to do. In a nutshell:

- the marketer conceives of the product by studying on-going behaviour and makes what people want and will buy (this usually involves a compromise so as to offer what people are willing to pay);

- the social advocate decides what is best for people and attempts to get them do what they think is good for them even if they don't like or want it.

Put even more simply, the marketer takes people as they are and designs an attractive offering aimed at some segment of the market. By way of contrast the social advocate attempts to change people to get them to fall in line with what the social advocate believes is needed or best for people.

The essential point is that marketing products and services is different to persuading people not to do something they like doing, eg., speeding. To ignore this difference has resulted in numerous ineffective mass media campaigns.

1.22 Road Safety Persuasion as Selling or Advocacy

The road safety authority is essentially "selling" or advocating people change in some way - ie, adopt safe behaviours or maintain them all the time (not just some of the time) or give up unsafe behaviours. The persuasion task is not like the marketer who persuades by offering what people want and will buy.

Road safety persuasion mostly targets people who tend to be non-compliant, who exhibit unsafe behaviours and asks them to change. The persuasion task is to get them to change their ways. The marketer by way of contrast targets people who are already doing what they want them to do and aims at altering their choices (choose ours not the competitors or choose ours vs choosing none).

This distinction between selling or advocacy and marketing (making what the customer would make or wants) is essential. The acceptance of this distinction leads to the conclusion that: *you can't sell brotherhood like soap, because successfully selling soap involves making the soap that people want (viz., marketing).*

1.3 Learning from Past Experience

The development of any particular mass media campaign can be approached from a number of different perspective. Road safety authorities invariably carry out a systematic analysis of the road safety problem, culminating in a "Brief" for an advertising agency if mass media is deemed to have a role.

This focus on the specific communication task is as it should be. However, it is very likely that there has been a prior attempt(s) at persuasion by the authority or some other authority with regard to the road user behaviour at hand. Why not learn from others?

1.31 *A Continuing Interest of The Federal Office of Road Safety*

The Federal Office of Road Safety, for a number of years, has been keen to document what is known about road safety mass media campaigns. To this end it has funded a number of publications:

- *A Review of Education and Public Relation to Road Safety,* J. Walter Thompson Advertising (1973).

- *The Development and Assessment of a Drink-Driving Campaign: A Case study,* Elliott & South (1983), CR26.

- *Effective Road Safety Campaigns: A Practical Handbook* Elliott, (1989), CR80.

- *Effective Mass Communication Campaigns: A SourceBook of Guidelines,* Elliott, (1992).

These publications have attempted to document what experience and behavioural science has to offer those who are charged with developing campaigns. The basis of knowledge (wisdom?) is largely that of reviews by others. Sometimes (perhaps frequently) the reviewer may provide generalisations across campaigns even when no scientific evaluation of results (campaign effects) is available.

1.32 *Reviewing Past Campaigns*

As will be explained later, a wide search was undertaken to identify evaluated road safety campaigns across English speaking nations in the last decade or two. In the process a number of reviews were unearthed. These reviews make generalisations about mass media campaign effects.

The Federal Office of Road Safety now has available (on computer) almost 300 summaries of articles in which generalisations are made about mass media campaigns. Of the 300, almost 50 are directed to road safety.

This report does not attempt to provide an extensive review of these reviews. With respect to road safety campaigns this has largely been done elsewhere by this author (Elliott 1989; 1992 and by others (Wilde et. al. 1971; Avery 1973; Vingilis & Coultes 1990).

1.33 A More Systematic Approach

The Federal Office of Road Safety recognised the need for and potential value of developing a systematic body of knowledge of useful guidelines which could improve the chances of more effective campaigns for road safety.

Traditional narrative reviews can provide many valuable insights. The mass media literature abounds with such reviews. They have, and continue to be useful. Yet they are almost entirely subjective.

These subjective insights are almost never subjected to outside verification beyond the literature reviewed. They make interesting reading and may well contain the seeds for success.

Generally, such qualitative syntheses are not only subjective, they are very selective even if there is no conscious disregard of findings not in accord with the generalisations they are making. Those reviews which are impeccable with respect to (i.e. take account of conflicting evidence) are rarely ever comprehensive and the analysis, to date has never been quantitative.

Instead of looking at individual reviews it is conceivable that generalisations could be made by a review of all past reviews. However, this is likely to compound some of the weaknesses of individual reviews.

Analysis of past reviews of campaigns can provide a useful starting point by creating hypotheses for further testing. Each reviewer develops principles from his/her review of one or more campaigns regarding underlying success factors. Furthermore, each review specifies criteria for evaluation. Yet most reviewers, having conducted a review and postulating principles, almost never test out the theories or generalisations on a new set of data (i.e. another future set of campaign results).

This report details the first empirical study of road safety mass media campaigns with the aim of establishing what generalisations can be made with respect to evaluated mass media road safety campaigns.

Unlike traditional reviews its approach is more systematic and empirical. It is not without its limitations (documented later).

1.34 Beyond Mere Subjectivity

What is needed is not a review of reviews, i.e. another qualitative subjective review of past campaigns. Rather, there is a need for a systematic investigation of the large empirical evidence which already exists.

The author's own subjective review of reviews (Elliott 1989; 1992), reveals that whilst there are some common principles there is also considerable diversity of advice which emerges, seemingly reflecting the reviewers' own a priori beliefs and their selection biases.

As the volume of empirical studies grows (and a very large number of mass media campaigns have been implemented) the subjective reviewer's task becomes unmanageable. The human mind simply cannot cope with the large number of variables across so many studies.

1.4 Meta-Analysis: a Method of Integration

Meta-Analysis is essentially "a way of thinking that is useful and efficient in terms of the use of available information" (Farley & Lehmann 1986, p97). It involves a *more objective means of integrating results* from the range of individual studies already available.

1.41 A Statistical Analysis

With respect to the task at hand meta-analysis represents a statistical analysis across a large collection of individual mass media campaign results from individual studies for the purpose of integrating the results.

Meta-analysis, unlike qualitative reviews (even qualitative reviews using elementary voting or box-counting procedures see Hedges & Olkin 1985), is able to indicate not only what effects have emerged from mass media campaigns but under what conditions and the magnitude of such effects.

Whereas a traditional review or synthesis looks for generalisations and may count in some systematic way, the statistical data is largely ignored. In essence reviews, at best, look at whether effects are or are not statistically significant. In Meta-analysis the statistical elements are key to the analysis. Meta-analysis normally attempts to use p values and calculate significance tests using sample size, p values and effect sizes (more of this later).

In one form of meta-analysis (see Glass, et.al., 1981) the findings of each campaign are treated as independent observations which may be combined to calculate an overall "average" effect. By recording the properties of the campaigns and their results in quantitative terms, the meta-analysis enables the full power of statistical methods to be applied.

1.42 *Only as Good as the Data Available*

Meta-analysis is an approach, a way of thinking and analysis rather than a technique. A number of outstanding texts have been written on meta-analysis and which point out the range of techniques and an assessment of strengths and weaknesses (eg., Glass, et.al., 1981; Hunter et.al. 1982; Rosenthal 1984; Farley & Lehmann 1986; Hunter & Schmidt 1990).

What differentiates meta-analysis from traditional syntheses is its approach, including its objectivity and its statistical component.

It should be noted that meta-analysis is not perfect nor without its own weaknesses (see Monroe & Krishnan 1982). It also can share some of the weaknesses of traditional qualitative syntheses unless specific steps are taken to avoid them (see Ryan & Barclay 1982).

Whilst specific techniques are available for meta-analysis, they can only be applied if the data is in unusable form. Experience with so-called "social" marketing campaigns (including road safety mass media campaigns) is that many or all of the following circumstances apply:

- no measures are obtained;
- post-test only measures are obtained;
- measures are limited to trivial variables; e.g., "recall";
- statistical tests of effects are rare;
- sample sizes are not always given; and
- other critical campaign elements are not included in the documentation of campaign effects.

1.43 The 'File Drawer' Problem

In both published and unpublished literature "no effects" or "negative effects" data are likely to remain hidden. It is a human characteristic to boast of successes and hide failures. Published campaign results invariably favour positive effects.

Since the aim is to understand what is associated with success, this problem is not of enormous consequence. It would be if we desired to ask the more general question as to whether campaigns per se are generally effective. The focus in this review is more to answer the question: *'what differentiates successful from unsuccessful road safety campaigns?'*. However, an attempt will be made to answer the broader question - *'what effects can be expected from a mass media road safety campaign?'*.

1.5 A World First

This meta-analysis is, to the author's knowledge, the first ever carried out in road safety and one of the very few ever conducted on mass media campaigns in any field. A blue-print (proposal) for conducting a meta-analysis of "*Research on DUI Remedial Interventions*" was suggested by Wells-Parker & Bangert-Drowns (1990). Wilson (1988) conducted a meta-analysis of "*Source Effects in Communication and Persuasion*" and wrote:

> *"The main conclusion ... is that mass-media advertising contexts seem to generate the most resistance to persuasion versus other face-to-face persuasive communications" (p.19).*

The only other meta-analysis conducted on mass media effects was carried out by Hearold (1986) who conducted a meta-analysis of "*1043 Effects of Television on Social Behavior*".

1.6 Acknowledgments

The author would like to thank the Federal Office of Road Safety for both its foresight in supporting a meta-analytic study and its patience during the conduct of the study.

Initially the author had planned to include evaluated health campaigns in the meta-analysis. The burden of this task was enormous as predicted by Flay (1987). To date, the cases have been collected but not coded or analysed.

Instead of testing a wide range of generalisations from the reviews of mass media campaigns this report tests a narrow sub-set forced upon the research by lack of data. Indeed, the most frustrating aspect of conducting a meta-analysis is the abysmal standard of reporting of evaluated mass media campaigns.

The uniqueness of this study demands that its findings be considered. However, the practitioner may wish to go beyond the empirical results and back to general reviews recognising that some of the generalisations are still in need of empirical validation.

2.0 Meta-Analysis

2.1 Introducing Meta-Analysis

It is a truism that different research studies in an area frequently provide inconsistent results. The research literature in different areas has grown dramatically in recent decades compounding the problem of reconciling conflicting findings. This applies especially to the literature in the field of mass media effects.

Many readers will not be familiar with meta-analysis. A general understanding of its methods is available in an easily readable form in Bangert-Drowns (1986); Kulik & Kulik (1989) and Wells-Parker & Bangert-Drowns (1990). For those who wish to undertake a meta-analysis the more recently published *Methods of Meta-Analysis* by Hunter & Schmidt (1990) represents a state-of-the-art review.

Meta-analysis consists not only of procedures and a way of thinking, it involves a range of analytic approaches each with their own strengths and weaknesses. Bangert-Drowns (1986) suggests that there are five forms of meta-analytic method. The study reported in this volume uses one method only. The choice of method reflects both the purpose of the integrative study and the nature of the data available.

2.11 The Relevance of Meta Analysis

Meta-analysis is designed to integrate results from a large number of studies using summary statistics. This enables researchers to draw conclusions from the aggregate that single or smaller subsets of studies do not allow. Meta-analysis is a relatively recent area of study and the basic principles are outlined in the next sub-section.

In essence meta-analysis, as used in this report, treats those evaluated mass media road safety campaigns as a population and sets out to answer questions by analysing the population of campaigns. Instead of making generalisations on the basis of individual campaigns, meta-analysis attempts to answer questions by looking across all the campaigns. Meta-analysis provides a more objective means of carrying out traditional reviews of individual case studies.

2.12 Meta-Analysis: A Fundamental Part of Science

Meta-analysis has much to offer especially given the exponential growth of studies in any field. In the case of road safety mass media campaigns the number of available evaluated campaigns is beyond the ability of any reviewer to objectively review what the literature (the campaigns) has to say about the scientific process in this area. According to one writer:

> *"Meta-analysis is not a fad. It is rooted in the fundamental values of the scientific enterprise: replicability, quantification, causal and correlational analysis. Valuable information is needlessly scattered in individual studies. The ability of social scientists to deliver generalizeable answers to basic questions of policy is too serious a concern to allow us to treat research integration lightly. The potential benefits of meta-analysis method seem enormous."* (Bangert-Drowns 1986 p 398).

2.2 The Meta Approach

The lack of scientific method for integrating a mass of research findings was noted decades ago. Glass (1976) provided the first comprehensive approach to aggregating the findings of a large number of studies. Glass coined the term "meta-analysis" and proposed the following series of steps or stages.

2.21 Four Basic Stages

Stage 1	use objective methods to find studies for a review
Stage 2	describe the features of the studies in quantitative or quasi-quantitative terms

Stage 3 express treatment effect of all studies on a common scale of effect size

Stage 4 use statistical techniques to relate study features to study outcome.

Although the basic methodology has had some refinements and extensions suggested by other authors, the essential stages for the procedure are common.

Meta-analysis, in application, concentrates on the size of the treatment "effects" in different studies and not simply the statistical significance of the treatment result. The meta approach involves investigating the impact of specific study features specified in stage 2 above on the "effect" side. In the case of the road safety campaigns, for example, the study variables investigated could be the campaign message characteristics, the type of media or media supports used, whether the campaign was backed by legislation and so on. Glass proposed that such features should be regressed on the effect sizes in different studies to assess their relationship to the study outcomes.

Prior to Glass's work, general literature reviews and "vote counting" approaches were used to cumulate the findings from a mass of studies. The shortcomings of traditional quantitative approaches to the problem of integrating research findings across studies is discussed elsewhere (Glass McGaw & Smith 1981; Rosenthal 1984; Hedges & Olkin, 1985;)..

One of the most substantial contributions of meta-analysis has been the highlighting of the limitations of traditional statistical testing applied in a limited way. Hunter and Schmidt (1990) show how misleading conclusions may be drawn from standard two way Chi-Square tests on tables and the common errors made in statistical tests. They comment *"The typical use of significance tests results leads to terrible errors in review studies"*. They provocatively propose that *'maybe it is time to abandon the significance test.'"(p.31)* Hunter and Schmidt propose a meta approach for review analyses that involves correcting for methodological artifacts on the outcomes of individual studies.

2.22 *Locating Studies for a Review*

The first stage of a meta-analysis involves locating all relevant studies both published and unpublished. Failure to include unpublished studies results in the "file drawer" problem where biases may arise because unsuccessful studies may not be reported on. The general approach is to exclude no studies on a priori grounds if sufficient information is available.

Studies were excluded from the meta-analysis of road safety campaigns where no pre and post measurements were available in the absence of a control group. In rare instances, where it was considered there was insufficient data to calculate an effect size, studies were also excluded.

In the second stage, the study characteristics are coded so that in later analysis study outcomes (in terms of effect size) and their relationship to the characteristics may be investigated. These study characteristics are referred to as "moderator" variables.

2.23 *Effect Size*

The third stage involves expressing the treatment effect(s) of all studies to a common scale of effect size.

Commonly effect size (ES) may be defined as the mean difference in experimental outcomes between treatment and control subject groups divided by the standard deviation of the control group. This effect size measure is known as the "d" statistic and has the form;

$$\text{ES or } d = \frac{\text{(Mean(treatment) - Mean (control)}}{\text{s.d (control)}}$$

It is thus a "standardised mean difference" and interpretation is related to the "Z score" interpretation. Some researchers propose the standard deviation used should be the pooled estimate but other estimators of effect size are favoured by some meta researchers.

Rosenthal (1984) noted that *"neither experienced behavioural researchers nor experienced statistitions had a good intuitive feel for the practical meaning of such common effect size estimators as r^2, omega^2, epsilon^2 and similar estimates" (p.130).*

Generally researchers favour different effect size statistics because of their different statistical properties. Hunter and Schmidt, for example, use the correlation coefficient "r" and provide the trivial conversion formula approximation between the "d value" and this measure of effect size:

d = 2r	for .21<d <.21
r = .5d	for -.41 <r <+.41

The purpose in using the "d value" approach or other estimators of effect size is that it provides a standardised measure enabling comparisons across studies. If the effect sizes (d values) are all similar (homogeneous) then meta-analysis has little to offer.

2.24 *Relating Study Features to Study Outcomes*

The final stage in meta-analysis, if the effect sizes are not homogenous, is to identify the moderator variables and their relationship to effect size. Techniques, including correlation analysis, cluster analysis, ANOVA and regression, have typically been employed to identify key moderators and homogenous sub-groups of research studies.

The ultimate statistical objective in meta-analysis, if homogeneity is evident, is to formally test the subgroups identified for homogeneity of effect sizes. This may allow definitive conclusions to be drawn by concluding that the variations in effect size in different studies in the subgroup are due simply to chance variation.

2.3 Advances in Meta-Analysis

Since Glass's original definition of classic meta-analysis, while the original formulation has proven sound, other meta analysts have suggested refinements and alternative approaches.

The first main criticism of Glass's approach is that the meta-analysis approach mixes "apples and oranges" by including studies with different outcome measures. A second criticism is that by coding several effect sizes for a single study the statistical results of regression and other analyses to identify moderators are invalid. Such double counting means the results are not independent. Another key criticism of the Glass approach is that chance associations between moderator variables and effect size estimates may occur. These criticisms are valid and there are no pure statistical solutions to these problems.

Rosenthal (1984) Hedges and Olkin (1985) and Hunter and Schmidt (1990) provide detailed criticisms and propose refinements and different approaches to meta-analysis in order to overcome specific concerns.

In evaluating road safety campaigns in this review a Glassian meta-analysis was performed. While the author was aware of the limitations and valid criticisms of some aspects of Glass' methodology, the nature of the research studies to be reviewed suggested this approach was appropriate. The information on and nature of campaigns available meant it was not technically possible to employ the other alternative meta methodologies, such as Hunter and Schmidt's, to provide a comparison, even if were desirable so to do.

Hunter and Schmidt (1990) make a persuasive case for considering the effects of sampling error and other artifacts in comparing effect sizes across studies, raising concerns about the parsimony of results obtained in a Glassian meta-analysis. However, their methods may be biased toward attributing too much variability to artifacts and too little to real, relevant study characteristics (Raudenbush 1991).

2.31 *Meta-Analysis is Controversial*

Meta-analysis represents an advancement over traditional synthesis in literature reviews. It has many devotees and critics. But even its critics (e.g. Slavin (1986) do not advocate "*a return to traditional review procedures*" (p.5). Slavin, in particular, advocates an alternative to meta-analysis - "Best evidence synthesis", which is merely a modification of meta-analysis and requires judgements to be made about each study and some excluded. Our approach is to leave all evaluated studies in our analysis in keeping with Glass (1976) and Hunter & Schmidt (1990) and treat "quality" (e.g. a control group) as a variable to be investigated.

3.0 Meta-Analysis of Road Safety Campaigns

3.1 The Broad Objective

The objective of this paper is to examine the nature and characteristics of successful and not so successful road safety campaigns using an empirical meta analytic approach based upon hard measures of "effect".

The cost to the community of road traffic accidents in Australia and overseas has resulted in a wide range of road safety campaigns being implemented. These have been designed with a wide range of goods in mind from merely increasing awareness of issues to changing road user attitudes and behaviour. The purpose, in using meta-analysis to examine these campaigns and their impact, is to attempt to draw general conclusions about the level of impact of different campaign approaches.

3.11 Categories of Road User Behaviour

The road safety campaigns considered cover the following areas of road user behaviour:

- vehicle restraint usage by drivers, passengers and children;
- drink driving;
- bicycle helmet usage;
- motorcycle safety;
- pedestrian behaviour of adults and children;
- speeding behaviour.

3.12 *Range of Campaign Objectives*

While the ultimate aim of these campaigns is to modify or encourage safer behaviour in some cases the communication objective involved more intermediate objectives such as providing information or changing attitudes and perceptions. Road safety campaigns may have their impact measured therefore in terms of the success in the areas of:

- awareness
- knowledge about the issue/actions
- attitude/interest
- motivation/intention
- behaviour

An acceptance of intermediate measures as legitimate outcomes of mass media campaigns recognises the limits of mass media alone to bring about changes in behaviour (Elliott 1989; Elliott 1991). This assertion is and will be tested in the meta-analysis.

In some cases a single campaign may have multiple outcome measures of success.

3.2 Locating Studies/Cases

An exhaustive search was undertaken to locate road safety mass media campaigns. An extremely large number were identified but most were not evaluated and therefore not included in the meta-analysis. Evaluation as a criteria for selection, had to involve some measure before and/or during/after the campaign.

The search process was exhaustive and iterative involving:

- computer literature searches across a wide range of data bases including LASORS, HEAPS, APAIS. FORS, ARRB and UNSW facilities were utilised. Where possible every bibliography of any campaign or reviews of mass media campaigns were perused and additional campaigns identified in road safety, health or social (non profit) marketing.

- for each campaign identified details were sought by way of literature from libraries or authorities in Australia and the rest of the English speaking world,

- hundreds of letters were also written in an effort to identify and obtain unpublished campaigns - many ended up not being useful because of lack of evaluation or primitive evaluation (eg. post only).

Very few evaluated road safety campaigns are published in journals (see 4.11). Most appear as reports (often unpublished) by authorities and therefore not easily identifiable or obtainable.

A computer literature search on any available data base is unlikely to find more than ten per cent of the studies used in the current meta-analysis.

The search process was as all embracing as possible. Initially it included any road safety campaign. A decision as to its usefulness was left until the details were obtained. Usefulness was a pragmatic concept involving:

- some form of mass media used, not solely school-based (education),

- some form of effect size could be calculated because pre and post measures on some variable was available,

- some information was available about the campaign itself such as message, media, rationale etc.

This search process highlighted three concerns:

a) most campaigns are not evaluated or else use only very primitive evaluation (eg. post only),

b) most campaigns are not published in main stream road safety literature (presumably because of a. above); and

c) there is no commonly used format for reporting case histories or studies of campaign evaluations. Accordingly, especially in the published literature the most common practice is to exclude much of the detail - the very detail essential to scientific progress.

3.3 Coding Studies

On the positive side a sizeable minority of studies (campaigns) used an experimental and control group in the evaluation.

In the first stage of the meta-analysis of road safety campaigns all studies located, unpublished and published, were coded using the code frame in the Appendix 1. This code frame covered details such as:

- report form, year of publication, etc
- location
- campaign orientation and supports
- campaign basis
- message characteristics and appeal emphasis

and other variables that might be moderator or explanatory variables of the impact (as measured by the d value effect size measures).

A large number of studies were excluded primarily because there was insufficient data to estimate effect size including no pre and post measures given. All too often campaigns are assessed by post only measures focussing on awareness of campaign messages.

The studies included in the analysis were finally categorised into five separate road safety areas:

- restraint (seat belt usage) by drivers, passengers and children;
- drink driving;
- speeding;
- bicycle helmet usage; and,
- general road user attitudes and behaviour including pedestrian and motorcycle behaviour.

In almost all of the included studies the key outcome measures available were sample proportions, before and after the campaign. In a sizeable number of studies a control group was used and this additional information was used to estimate the net impact and hence the effect size (d value). The simple method of calculation used is given in Appendix 2. As far as possible, the d values were calculated from the raw published data. Conversion of reported t values, X^2 values, p values, etc., to d values was avoided. This avoided researcher bias to some extent where the focus was on the more successful perspective of the campaign, ie., there is a tendency to present only statistically significant findings (usually positive) when writing up results.

The range of outcome measures resulted in several effect sizes being calculated for some studies. The main campaign objectives and outcome measures are given in Appendix 4. The specific objectives of the restraint and drink driving campaigns are also summarised in this appendix.

The coding of multiple effect sizes was considered appropriate because:

1) The varying campaigns had different strategies and objectives;
2) The outcome measures ranged from simple awareness of the campaign materials or issues through to an observed behavioural change.

In the analysis stage it was necessary to be able to identify subgroups with common road user behaviour objectives (eg. use of restraints).

In the case of the restraint campaigns a single summary effect size measure was used. This was because it was not always clear which occupants were the main target of the campaign (driver, front seat, rear seat passengers) and so a summary approach was taken, although child restraint studies were separately identified.

3.4 Some Specific Coding Problems

3.41 Lack of Measure of Campaign Intensity

One particular problem with the studies analysed (and which needs to be addressed in the future) involves the lack of a measure for campaign intensity. The size of the stimulus on a common yardstick was not available for coding and reliable qualitative assessments could not be made. The different campaign durations, geographic areas covered and other factors make campaign intensity an unknown factor. A preliminary effort was made to estimate from the media used and information on media supports to attempt to calculate a crude measure of intensity. This was so arbitrary it was not considered to be a satisfactory measure of intensity or campaign reach.

3.42 Coping with Negative Effect Sizes

Another specific problem with the data set was that many campaigns showed negative effect sizes. While this was frequently due to the control group adjustment it conflicts with common sense. A nil impact would be not surprising in an ineffective campaign but a large negative impact suggests poor quality experimental controls rather than simple chance variation in the pre and post data measures. These results highlight the nature of road safety campaigns as difficult experiments in the real world laboratory. It was decided that it was better practice to leave these effect sizes as estimated and not treat negative values as having zero impact. Influences beyond the campaign could result in negative values.

3.43 Diversity of Campaigns

The above problems also partly reflect the range of campaigns in road safety that have been used in Australia and overseas. The campaigns coded ranged from simple leaflets handed out to large scale mass media and publicity based campaigns. It would be surprising, given this range of campaign types and their differing objectives, if the outcomes were homogenous.

3.44 One Simple Effect Size Measure

A final concern with the meta-analysis data set in this review is the reduction of a complex campaign outcome to a simple effect size. While this is the basis of meta-analysis, the nature of social advocacy campaigns may mean that a campaign with a low d value (small effect) may have been successful in the longer term in establishing the basis for, or reinforcing attitudinal and behavioural change but not over the shorter period of the experiment. The lack of an effective theory on how such communication works in different contexts limits the extent to which we can conclude a d value is an accurate assessment of a campaign's effectiveness.

3.5 Limitations in the Road Safety Context

Kulik and Kulik (1989) note that meta-analysis has been criticised as a poor name for quantitative reviewing and suggested it is grander than it need be. The authors point out that some reviewers have considered "synthesis" a better word than meta-analysis to describe the review function. Meta-analysis in the Glassian form, as applied in this report, has limitations. It should not therefore be considered to produce conclusive proof in this application. It is more correctly seen as an attempt to quantitatively synthesise the results of a large number of campaigns, and summarises campaign features associated with successful outcomes.

In this application of Glass' approach two specific limitations should be discussed.

3.51 *"Apples and Oranges"*

The mixing of "apples and oranges" aspect. Treating different types of campaign outcomes as homogenous, including knowledge, attitudes and behavioural change clearly violates some fundamental theoretical principles. Similarly coding multiple effect sizes for each study in some areas offends the statistical purist and limits the validity of subsequent analysis. However, for practical purposes in the complex road safety campaign area, other approaches would preclude exploration and the generation of hypotheses.

While the Glassian analysis criticisms are valid no alternative analytic strategies are available for the type of data used in this review.

3.52 *Intensity of Campaign*

The lack of a variable, subjective or objective, to measure the reach or intensity of specific road safety campaigns is a major omission in almost all of the reported campaigns. In this meta-analysis no weighting could be given to the intensity over time of individual campaigns for use as an explanatory variable for the consequent effect size. The intensity of the stimulus is only partially indicated by the media used and campaign supports.

4.0 *The Road Safety Data Set*

The composition of the resultant data set provided 175 effect size measurements for a total of 87 reports of campaigns. The number of campaigns in the different road safety areas is shown in Table 1.

Table 1

Campaigns Included in Data Set

	Number of effect sizes	*Number of studies**
Seat belts	39	39
Drink driving	93	27
Bicycle Helmets	6	4
General Road User (includes motorcycles, pedestrian etc)	25	11
Speeding	12	6
Total	175	87

* Includes the same campaigns conducted in different geographic locations in some cases.

The campaigns ranged from merely providing knowledge (for example about alcohol content of different beverages) to attempting to induce behaviours specific (eg., seat belt wearing). The multiple effect sizes per study measuring these different outcomes are particularly marked in the drink driving area where 27 reports of campaigns provided some 93 effect sizes.

4.1 Data Set Features

In this section the main features or characteristics of the studies reviewed are summarised. The use of multiple effect sizes for some studies mean that caution needs to be used in drawing general conclusions about the nature of road safety campaigns conducted. The objective of this section is to summarise the data set with effect size as the base. The tables refer to the number of effect size measures not the number of campaigns.

4.11 Study Report Type and Location

The form of the report and location of the studies is shown in Table 2 below.

Table 2

Study Report Type and Location

Report Type	*Number of Effect Sizes*
Book	17
Journal	29
Report (Authority/agency)	88
Conference/Proceeding	30
Other published	5
Unpublished (supplied in piece-meal form)	6
Country	
Australia (National)	1
One Australian State	64
Part of some Australian State	11
USA	35
Europe	30
Other (eg. NZ, Canada)	34

Only a minority of effect sizes came from reports of evaluated road safety campaigns published in journals. Mostly such evaluated campaigns, if documented, are in the format of a report by an authority or research organisation or some other agency.

Of the 175 effect size measures, 43% were related to Australian Campaigns, 20% USA, 17% European and the balance other countries (mostly New Zealand and Canada).

4.12 *Campaign Duration and Orientation*

Table 3 indicates the time span of the basic campaign orientation.

Table 3

Campaign Duration and Orientation

Duration	*No. of Effect Sizes*
4 weeks or less	49
5-10 weeks	70
11-20 weeks	19
20 weeks plus	28
Not known	9
Orientation	
Educative (information oriented)	117
Persuasive	37
Marketing (social)	2
Other	12
Not stated	7

The table shows that over two thirds of effect size measures had an information orientation and the campaign duration in the majority of cases was less than 10 weeks.

A specific (social) marketing orientation was claimed in only two studies. In one of those it was merely a labelling and in the other it was attached to the case after the event. In neither case was a truly social "marketing" approach central although in the latter study elements of a social marketing approach were in evidence.

4.13 Developmental Approach

The basis of campaign development and prior research details are shown in Table 4.

Table 4

Approach to Campaign Development

Basis of Campaign Development	*No. of Effect Sizes*
None Given	25
Intuitive	30
Theoretical model	44
Not stated	29
Other (experience, research etc)	47
Prior research	
None undertaken	17
Qualitative	64
Quantitative	37
Other - relevant past campaigns/experience	72
Not stated - insufficient information	41

Around a quarter of effect sizes were associated with a theoretical model of campaign development/effects. Usually the basis of campaign development is none or intuitive.

A sizeable number of effect sizes were associated with prior qualitative research with a lesser number with quantitative. In around a quarter of the cases insufficient information was available to determine if any research was undertaken. A common strategy was to base campaigns on prior campaigns or experience rather than conduct research. This "other" category also included "observation" of people.

Table 5

Pretesting of materials or pilot testing in an area

Pretesting/Pilot testing	*No. of Effect Sizes*
Yes	72
No	43
Not stated	60

Pretesting or pilot testing was involved in over 40% of the effect sizes.

4.14 *Campaign Characteristics*

In addition to the media used in the campaigns, most campaigns were supported by legislation and publicity. Enforcement was less likely to be used as a support.

Campaign Supports			
	*Yes**	*No*	*Not Stated*
Publicity	117	34	24
Legislation	124	33	18
Enforcement	59	100	16
Other	33	133	9
* includes already existing supports			

"Other" in the table above includes brochures and videos (13) behavioural supports/response channels (7) and incentives (3), judicial and rehabilitation (2), competitions (3), school (4), etc.

Media Used	*No. of Effect Sizes*
TV	121
Radio	105
Newspapers/Magazines	99
Billboards	54
Pamphlets	64
Other (eg. PR)	62
Media Placement	
Continuous	91
Bursts on and off	24
Not stated	61
Number of Creative Executions Campaign	
Single ad	25
Multiple ads	125
Not stated	26

Television and radio were related to over half of the effect measures as were campaigns run continuously and campaigns using more than one commercial as part of the campaign.

4.16 *Message Characteristics*

A number of different codes were used to cover the content of messages as can be seen in Tables 9 and 10.

Table 9

Message Characteristics

Spokesperson	*No. of Effect sizes*
Voiceover alone	23
Expert	8
Celebrity	19
None	14
Unknown	21
Cartoon	4
Other (combinations of voiceover, peers etc)	22
Persuasion Orientation	
Educative	106
Reinforcing/carry on	4
Requesting or instructing change or modify behaviours	57
As for 3 but new behaviour	1
Not stated	7

Generally speaking the orientation is one of providing information (educative). A range of presenters/spokespersons were used. In a sizeable minority of cases insufficient information was given as to spokesperson type.

Table 10

Appeal Emphasis

Appeal Emphasis			
Code	(1)	(2)	Not stated
Positive (1) or Negative (2)	64	85	26
Authority (1) or None (2)	63	73	39
Social Proof (1) or None (2)	51	58	67
Rational (1) or Emotional (2)	126	30	19
One sided argument (1) or Two sided (2)	156	4	15
Direct (at me) (1) or indirect (2)	141	22	12

Many (most) of the effect sizes were associated with campaigns using one-sided arguments, aimed directly at the road user using a rational appeal.

4.17 Campaign Variables Coded but Not Included

Some specific variables coded were not subsequently reported on in this analysis. These were:

1) Duration of new behaviour. Every study in this data set was aimed at achieving regular/continuing behaviour.

2) Legislation as a campaign support and other campaign supports that were already existing were treated simply as present. In only four studies was new legislation specified (RB2b, RD22, RG7, RG8).

3) Target Audience. The number and nature of target audiences was coded. In most cases the targets were broad. The exception was in the drink driving area where 9 studies involved campaigns focussing on specific problem users. Generally, these were young males. However in around half of these cases multiple targets were involved. The relatively small samples were inadequate to make it worthwhile to draw conclusions about specific sub groups.

4) In terms of campaign content and the use of music and humour the "don't know/not specified" rates were very high. Only 5 campaigns had music and in only 3 was humour present. In the large proportion of cases these aspects were not recorded.

5) Type of survey instrument. All the seat belt campaigns involved observation although some were supplemented by telephone or face-to-face surveys. Similarly over half of the other campaign areas used observation. It was considered inappropriate to draw conclusions about the survey instrument on the basis of the information provided and focus more on the type of attitude/knowledge and behavioural change.

4.2 D Value Interpretation

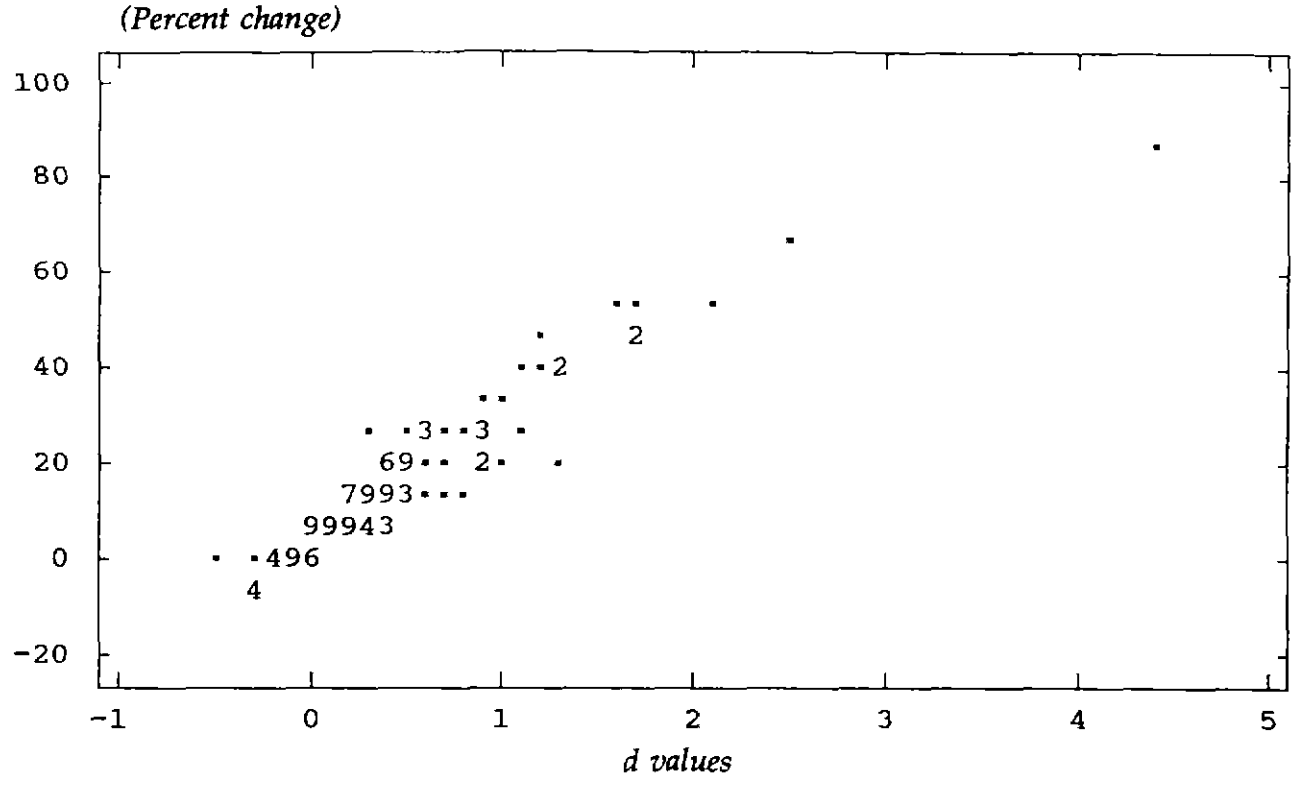
The criticism noted in 2.23 that d values and other standardised effect size measures used in meta-analysis do not have transparent interpretations is valid. One translation of meaning is that a d value of 1.0 suggests an individual is moved from the mean (median) to the 84th percentile point in the distribution of the outcome under consideration. This is a very sizeable effect. It represents for the road safety campaign data a 25% change between the pre and post measures as can be seen in Table 11 below. In the meta-analysis in this report most measurements were based on percentage changes achieved by the campaign and the relationship between percentage change and d values is considered to be linear.

4.21 The Average Campaign Effect

For the main range of d values in this study the simple regression relationship between % change and d values in this total data set (including awareness measures) has the form: shown in Chart 1 where numbers represent points plotted on top of each other.

Chart 1

% change versus d value



Percentage change = 24.499 x d or d = $\frac{\%\ \text{change}}{24.499}$

$p < .01\ R^2 = .936$

Thus the following table shows the level of impact for different d values.

Table 11

% change in pre-post measures versus d values

% change	*d value*
2.45	.1
4.90	.2
7.35	.3
9.8	.4
24.5	1.0

Thus a mean (average) d value of around .3 found in the studies in this report corresponds to an improvement of around 7½% whatever the base level. As the base level changes this mean improvement does alter somewhat as indicated in the next section. **Thus an average road safety mass media campaign can be expected to result in a 7½% improvement.** This statement has never been made before in any empirical fashion and represents a world first.

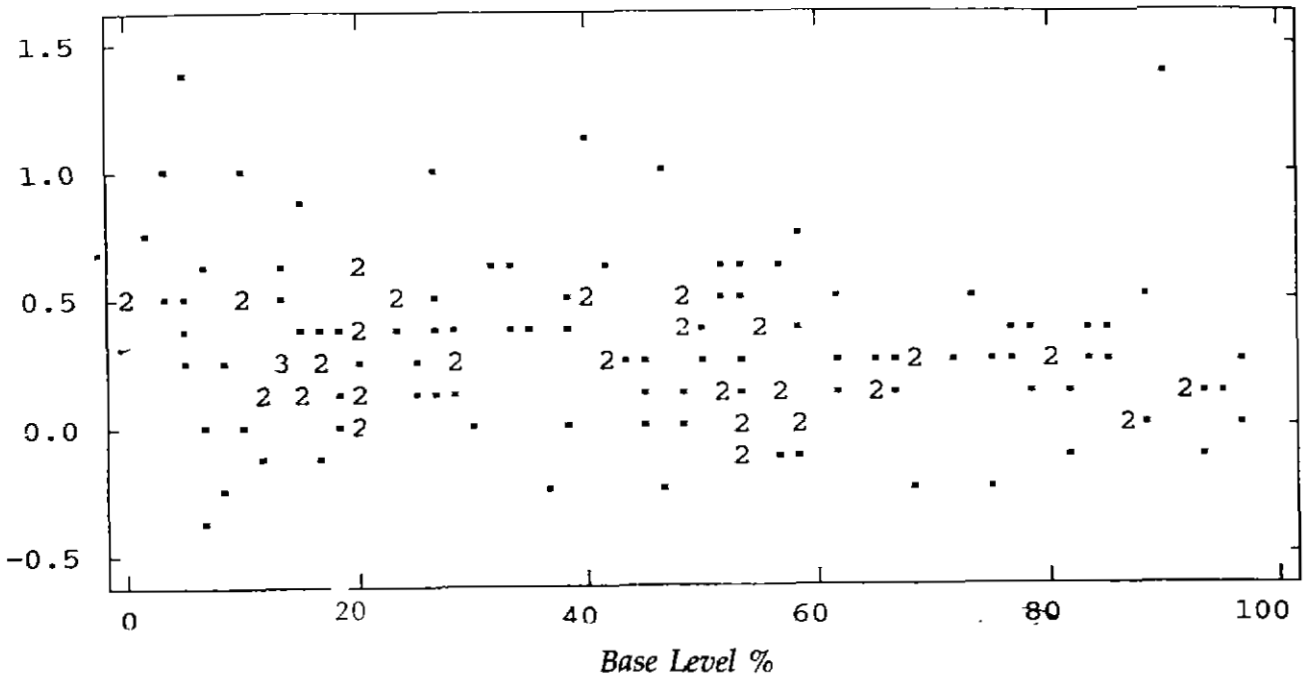
4.22 *Impact of Base Level on Campaign Effect*

It is interesting to note that there is a weak (R^2 = .092), but significant relationship ($p<.01$) between the campaign effect size and the base level of the knowledge, attitude or behavioural measure outcome. This is logical and simply implies it is easier to achieve higher percentage changes at lower base levels. Chart II, over the page, expresses the regression relationship. Mathematically it can be expressed as follows:

% change = 15.55 -.153 x (base level %) $p < .01\ R^2 = .092$

Chart II

Effect Size Versus Base Level



(numbers represent number of points plotted on top of each other)

At a 50% base level the average percentage improvement in outcome measure is 6.02%. At the 80% base level the average change is 4.04%. Table 12 below summarises the percentage improvement expected at varying base levels.

Table 12

Average % Improvement at Different Base Levels

Base Level	*Percent Improvement*
5%	8.97%
20%	7.98%
50%	6.02%
80%	4.04%
90%	3.36%

However, there are many outcomes which deviate markedly from these averages. The impact of the base level on campaign outcome is considered further later in this report.

4.23 Non-weighting of Effect Sizes

It was decided not to weight the effect sizes in proportion to the sample sizes in the main analysis of this report. This approach means that all studies have equal weight and may be criticised on the grounds that small and perhaps poor quality studies are given the same weight as extensive studies. This is a common criticism of Glassian meta-analysis where the philosophy is that no studies should be excluded on a priori grounds if possible.

The major concern with the data set under consideration was that the very large sample sizes in some studies (such as seat belt observations and BAC test results) would give disproportionate weight to these studies.

To be consistent with this all inclusive approach it was also determined that poor quality and outlier studies should not be excluded in the basic meta-analysis.

4.3 Outcome types

The hierarchy of outcome types and the relative effect sizes for the data set are shown over the page.

Table 13

Effect Size (d value) by Outcome Type				
Outcome Measure		*d value*		*No. of effect measures*
		mean	std error	*sample size*
1	Awareness of Campaign	1.137	.236	5
2	Awareness of campaign issue/ content	1.282	.322	13
3	Knowledge about issues	.301	.053	30
4	Attitude/ interest	.161	.078	15
5	Motivation/ intentions	.049	.110	4
6	Behaviour self reported	.054	.042	20
7	Behaviour observed/ measured	.316	.045	80
8	Other (casualty data)	.226	.065	8
	Total	.355	.041	175

The effect sizes are predictably high for the simple campaign awareness outcomes. It appears inconsistent that awareness of the campaign issue is higher than just awareness of the campaign but this is within the same confidence interval and might also in part be due to a prompting of the respondent to recall the campaign.

The motivation/intention measures and self-reported behavioural changes were surprisingly low. These measures are all in the drink driving area and include not only self reported driver behaviour and intentions but measures of intervention behaviour to prevent others from driving after drinking.

The attitudinal and interest measures are also lower than might be expected from psychological theory. These aspects are considered in the following sections. Again it should be noted, however, that a large proportion of attitudinal outcomes relate to drink driving beliefs about the effect of alcohol on driving ability. The low values suggest these attitudes have been somewhat difficult to change in many parts of the world.

The distribution of effect sizes for some of these outcome types is shown in the following graphs. These distributions indicate the range of values for the same outcome types and the lack of homogeneity.

Chart 3

Knowledge

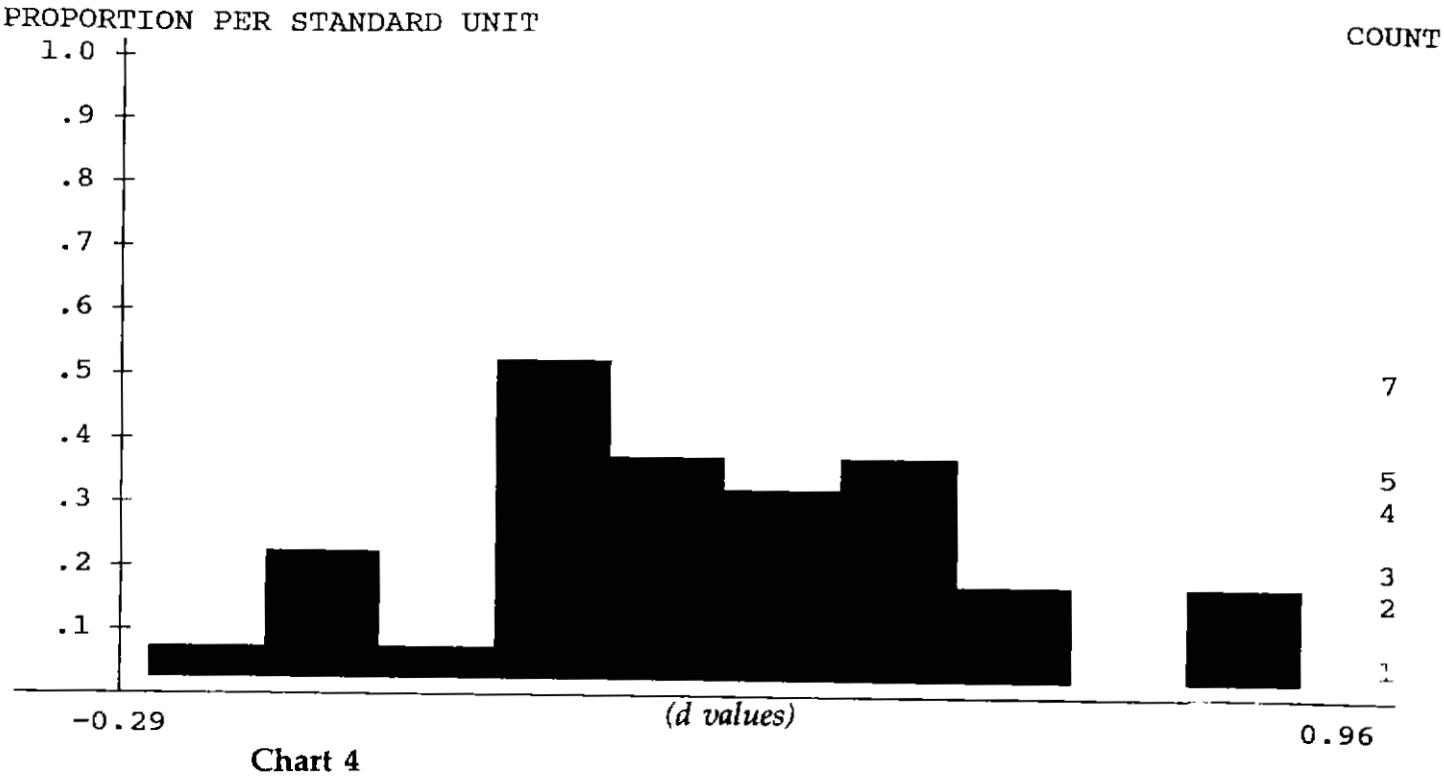


Chart 4

Behaviour - Self Reported

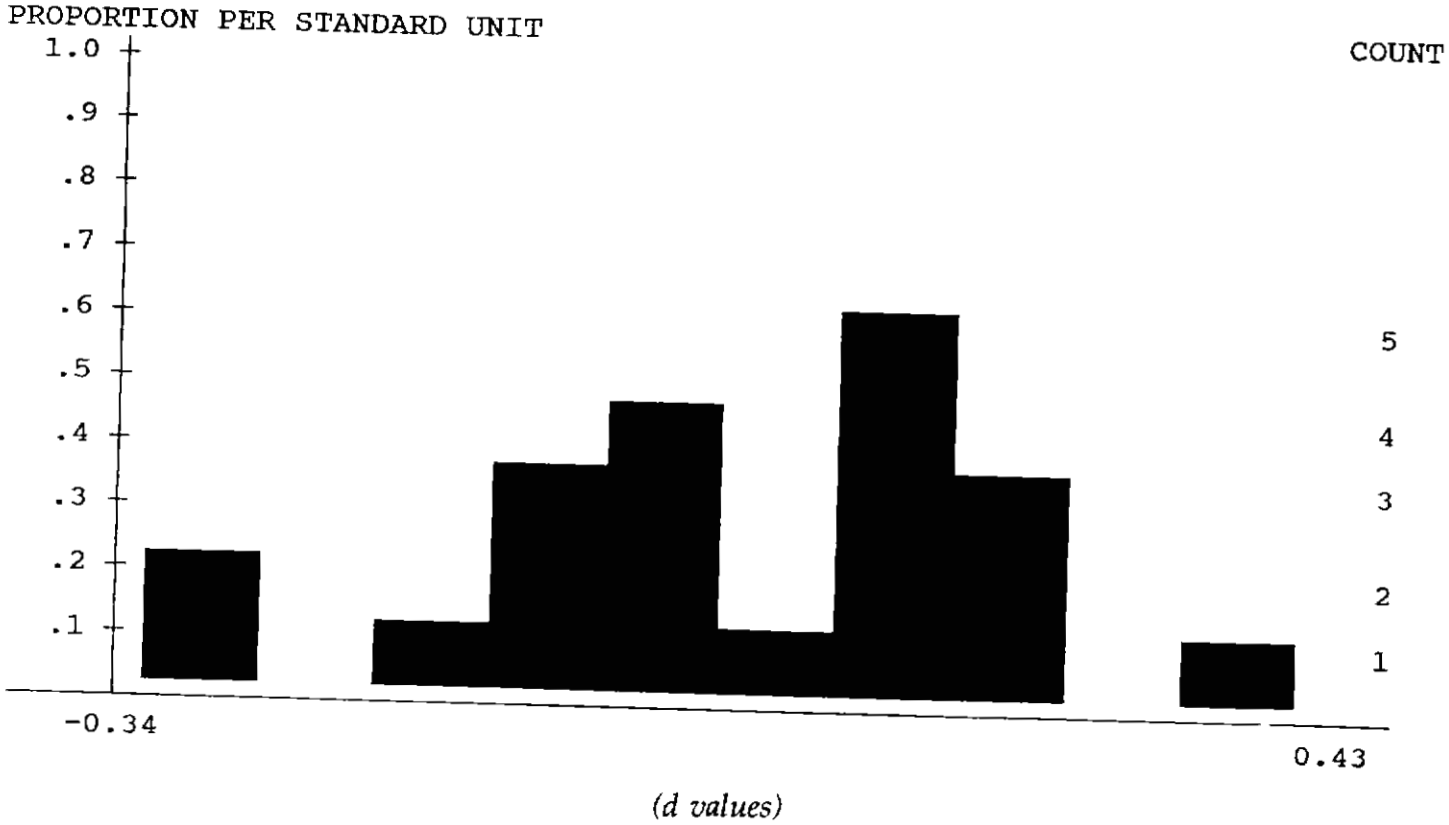


Chart 5

Measured Behaviour

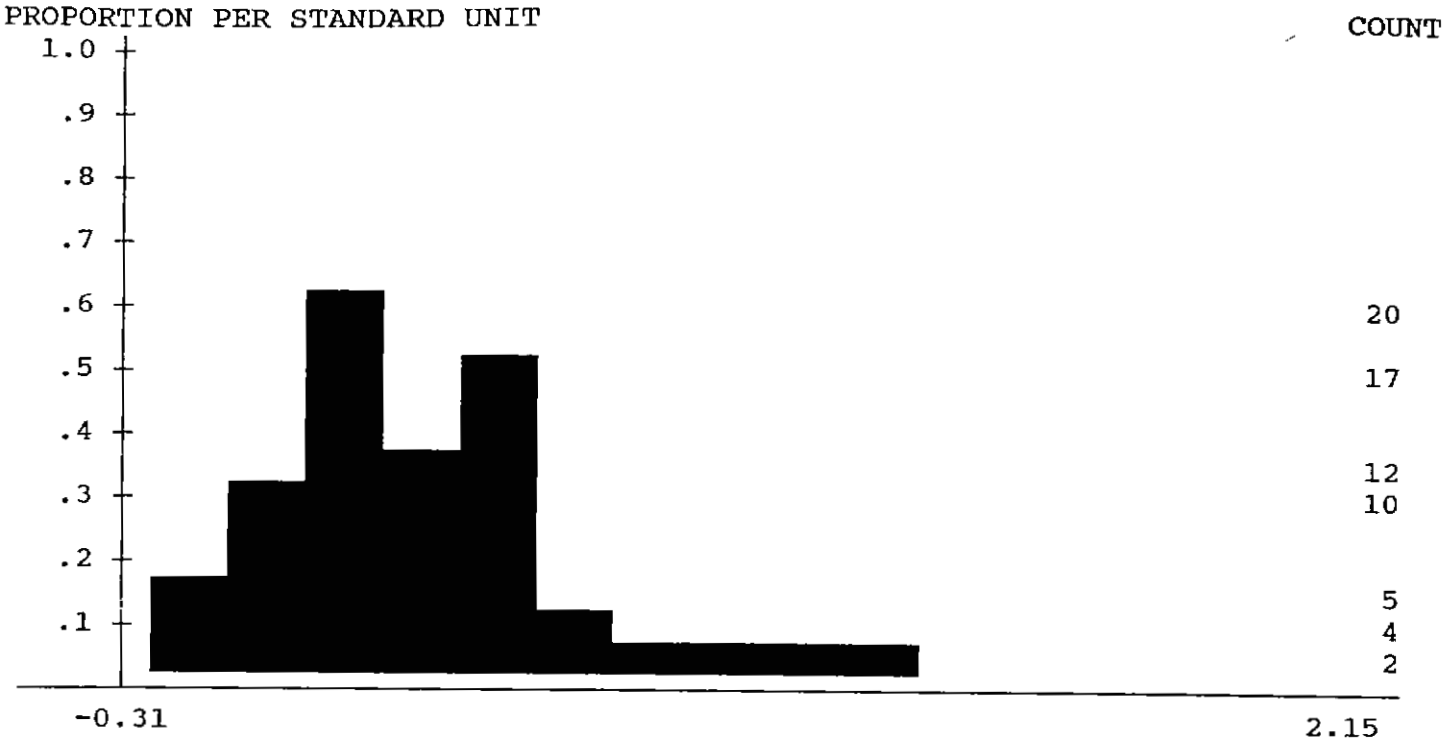
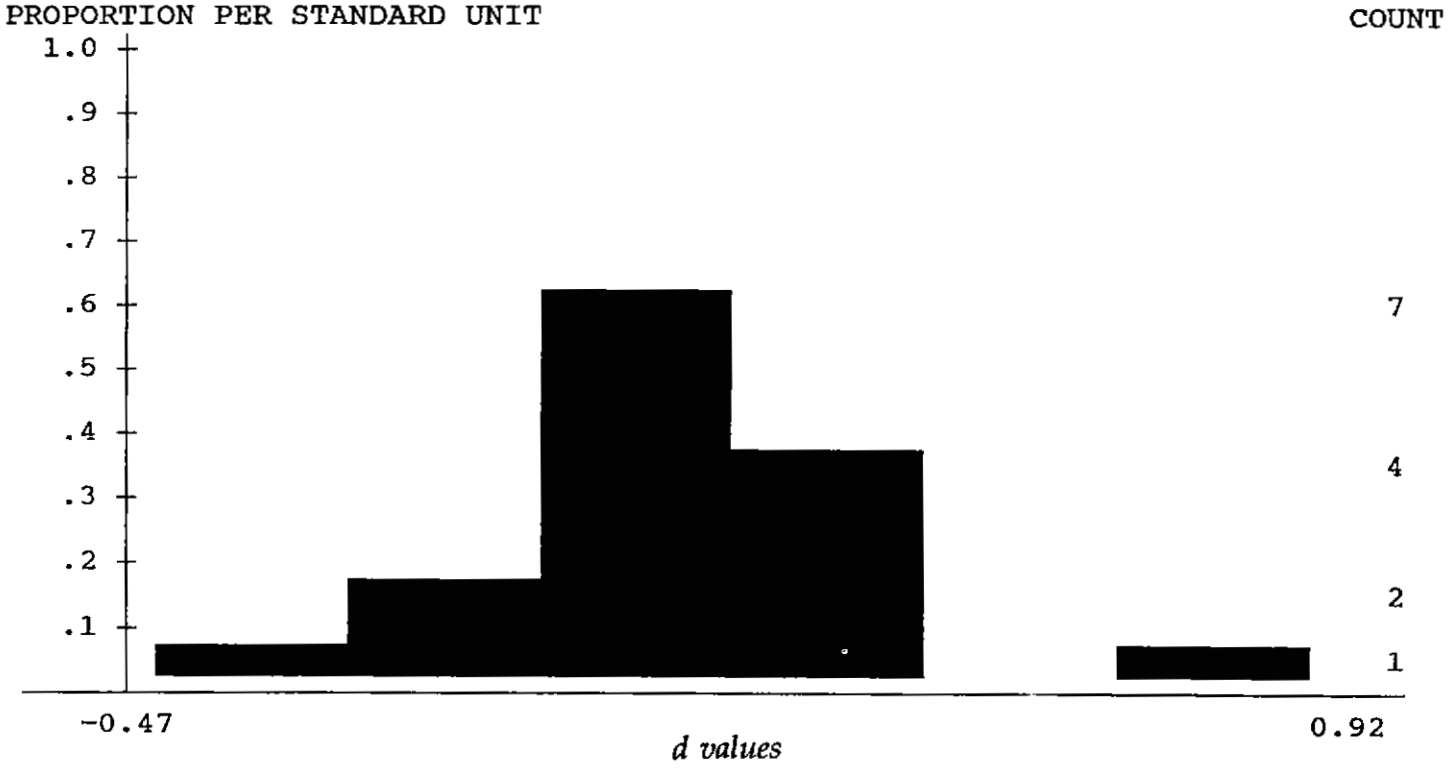


Chart 6

Attitude/Interest



4.4 Outcome Type by Campaign Area

In this section the mean effect size is considered for the main road safety road user categories by outcome measure. The table below shows the relative emphasis of campaigns conducted as well as the estimated magnitude of their impact in the different areas.

Table 14

Outcome Measures by Road User Campaign Category

			CAMPAIGN AREA				
	Outcome Type		Restraints	Drink driving	Speeding	Bicycle Helmets	General Road User
1	Campaign Awareness	mean		1.137			
		Std Error		.236			
		Sample n	0	5	0	0	0
2	Awareness of issues			.882			2.614
				.178			1.030
			0	10	0	0	3
3	Knowledge		-	.241			.841
			-	.045			.089
			0	27	0	0	3
4	Attitude/Interest			.166	.307		-.081
				.109	.048		.081
			0	10	3	0	2
5	Motivation/ Intention			.049			
				.110			
			0	4	0	0	0
6	Behaviour - self reported			.054			
				.042			
			0	20	0	0	0
7	Behaviour measured (observed)		.257	.702	.184	.551	.237
			.046	.251	.072	.174	.076
			39	9	9	6	17
8	Other		-	.226	-	-	-
			-	.065	-	-	-
			-	8	0	0	0

The small samples limit the ability to draw conclusions. However, it is noteworthy that the mean effect size for measured drink driving behaviour is very high relative to other effect sizes although the standard error is also large. The observed behaviour for effect size for bicycle helmet campaigns is also large. The relatively small impacts in the attitude/interest, motivation and self reported behaviour measures, as noted earlier, are also clearly shown.

The subgroups for the observed behaviour of different vehicle restraint target groups are shown Table 15.

Table 15

Restraint Campaign Effects - Observed Behaviour By Target Groups

Target Groups			
d values	All	Adult	Child Restraint
Mean	.257	.271	.191
std error	.046	.053	.089
N	39	32	7

4.5 The Search for Moderator Variables

The preceding results raise questions about the nature of the campaigns producing the various outcome measures. In Glassian meta-analysis the focus is on trying to identify the relationships between the study features and effect size where the varying effect sizes may be explained by specific campaign aspects.

4.51 Bivariate versus Multivariate Analyses

To identify potential relationships both bivariate and multivariate analyses were performed on the data. This report focuses largely on the bivariate analysis. Multiple regression as a tool poses considerable problems and only limited multivariate analyses were undertaken (see section 4.6) because of the nature of the data.

4.52 Excluding Campaign Awareness Measures

Initially all campaigns were included (ie, in the analysis so far) that met the criteria nominated in 3.2 above (eg. evaluated before vs after, measures could be calculated from the data, mass media of some form was involved and some details of the campaign materials and media was supplied).

In conducting both the bivariate and multivariate analyses it was decided to exclude any effect size measures (d values) which measured awareness of campaign or awareness of campaign issue or content. This was done for two reasons. First, awareness of a campaign (recall seeing/hearing the advertising) is largely a proxy measure of either expectations (ie, the respondent is expected to have seen it and so answers 'yes') or media weight and placement. It is largely a measure of exposure to the campaign and reflects one important element of a campaign. However, it is not of itself sufficient for evaluating the impact of any campaign. In most instances the purpose of exposure is to change knowledge, attitudes and behaviours. Exposure of itself it is a very limited objective - albeit a precursor to other more important outcomes.

Second, as indicated in 4.22 above the effect sizes for both simple campaign awareness (seen/heard) and campaign issues (seen heard.. topic) are considerably higher (Table 13) than for other outcome measures. Awareness of campaign issues was even higher than simple campaign awareness which probably reflects the likely research procedure where prompting can occur.

In all the subsequent analyses in this report awareness effect measures were excluded. This exclusion left in 157 individual effect sizes to be included in the analysis from the original 175 measures. The overall d value of this revised subset was .254 and the standard error = .028. The statistical assumption that these remaining measures were independent was not met but the analysis was intended as exploratory rather than definitive.

Table 16 below compares the summary results of the total sample with the revised sample (awareness excluded and multiple locations).

Table 16

Effect of Eliminating Awareness Measures

Total Sample	*Sample with Exclusions*
N = 176	157
Mean = .355	.254
SE = .041	.028

A summary of the characteristics of the campaigns in the main data set of 157 effect sizes is given in Appendix 3.

4.53 Main Bivariate Analysis of Moderator Variables

Virtually all the moderator variables considered in the analysis were converted to a dichotomous scale. Not all the coded variables were included as noted earlier in 4.17. For example, some were present too rarely to include (eg. music or humour). The mean d values for the moderator variables are shown in the table in this section.

The relative size of the standard error and the small sample sizes limit the conclusiveness of the findings. Typically the standard error is around .05 suggesting upper and lower bounds at the 95% level of around ±.10. The results need to be considered qualitatively to some extent. Some marked, statistically significant, differences are however summarised below.

Significant Differences between d values and Campaign Orientation

Persuasive versus educative t=1.94 p = .05

Basis of Campaign Development

Theoretical model versus none	t= 1.95	p = .06
Theoretical model versus intuitive	t= 1.54	p = .12

Research Prior to Campaign Development

Qualitative versus none	t= 1.84	p = .07
Quantitative versus none	t= 1.40	p = .17
Qualitative and Quantitative versus none	t= 1.72	p = .09

Campaign Supports

Enforcement versus legislation	t= 1.60	p = .11
Publicity and Enforcement versus legislation	t= 2.14	p = .03
Legislation and Enforcement versus legislation	t= 1.52	p = .13

Execution

Multiple ads versus Single ads	t= 1.73	p = .09

Spokesperson

Voiceover alone versus celebrity	t= 3.03	p = .01

Message Characteristics

Requesting or instructing change/modify behaviour versus educative/information oriented	t= 2.54	p = .01

Country

Australia versus US	t= 1.37	p = .17

The p values are the two-sided values with equal variance assumed. They indicate the probability of the difference occuring by chance variation in the sample.

The significance tests are not definitive because the observations are not independent with the bases being effect sizes and not studies. In addition it is assumed in the testing that d values are normally distributed.

No relationships were apparent with some campaign characteristics such as duration or the year in which the campaign was conducted. The mean d values for each of the moderator variables are shown in the extended Table 17.

A practical rule of thumb in determining "significance" in Table 17 is that a d value has to lay outside + or - twice the SE to be significant. Hunter and Schmidt (1990 pp 29-33) argue that confidence intervals (as per the rule of thumb) are superior to statistical significance tests which they suggest should be abandoned.

In addition the sample size (ie, number of effect sizes) should be considered when looking at Table 17. The emphasis should be on variables which are commonly present in campaigns. However, "other" categories often reflect such a diverse range as not to be very useful (eg. campaign orientation other included four campaigns with enforcement, one community based, one reminder, one incentive, one feedback; in total these provided 12 effect size measures).

Table 17 enables a number of observations to be made:

* The overall (average) effect size across all the measures is mean d = .254 and S.D. = .028. Thus the exclusion of simple awareness measures means that on average a mass media campaign can achieve around a 6% improvement (compare with 7½% in section 4.21).

* The study reporting source suggests limited bias with perhaps journals and conference proceedings a little more likely to focus on the more successful campaigns.

* The authors' conclusions on the extent of campaign success, not surprisingly, are in a consistent direction with the d values estimated.

* Campaigns with a persuasive orientation are more likely to be effective than those with an educative (informative) approach, although the majority use the latter approach. The mean d values are .355 and .210 respectively and the difference is significant.

* With regard to the basis of campaign development, campaigns using a theoretical model appear superior to those relying on intuition or no basis. Similarly campaigns where qualitative and/or quantitative research is conducted prior to campaign development are also more successful. The mean d value for campaigns with qualitative research is .302 compared to .117 where no research is undertaken.

* The campaign supports of publicity and enforcement all appear influential. The combination of publicity and enforcement appears to have a particularly definite effect.

* If television is used a higher impact is likely but this may be a defacto measure of campaign reach. Multiple advertisements may similarly reflect the extent of media usage rather than impact.

* In terms of the creative execution there is insufficient evidence (due to small samples) to assess the impact of the spokesperson type, although experts, celebrities and peers definitely have less impact than a simple voice over. Only a handful of studies noted that music or humour was used and so no conclusions may be hazarded on these creative aspects.

* Messages where the appeal emphasis is on emotional rather than rational grounds show a higher impact although this involves a relatively small proportion of campaigns. The mean d value for emotional appeals is .428. Campaigns where the emphasis is on requesting or instructing a change or modifying behaviour also appear more likely to have a high impact with a mean of value of .320 compared to .209 for educative/information oriented campaigns.

* There is an expected relationship between the base level of knowledge or behaviour and the campaign effect. This possible confounding aspect was recognised initially in the study design in calculating the effect sizes. The dilemma was whether or not to consider for example a 5% increase from a base level of 80% as a similar impact to a 5% increase from a base level of say 30%. From one perspective a 5% increase from a base level of 80% represents a 25% improvement for the presumed target of 20% of the population who do not have that characteristic. Both marketing and behavioural change theory suggests that the residual 20% represent a more difficult target to educate or persuade, having previously not been converted. From another more absolute perspective a 5% improvement from any base level may be considered to have a similar sized social benefit. In fact, the last 5% gives a much higher road safety benefits than the first 5%. It should also be noted that relatively few campaigns had a base level starting point of over 70%.

  The results confirm however that campaigns where the base level is under 50% have markedly higher effect sizes as expected from the analysis in section 4.22.

* Australian campaigns appear to have had a slightly higher effect size than US campaigns. This may relate partly to the more frequent presence of legislative support.

Table 17 (5 pages)

Bivariate Analysis of Campaign Feature and Effects

	Mean	Std Error	n
Campaign Orientation			
Educative	.210	.031	108
Persuasive	.355	.086	28
Social Marketing	.331	.113	2
Other (enforcement/ incentives etc)	.424	.068	12
Basis of Campaign Development			
None given	.141	.047	22
Intuitive	.193	.043	28
Theoretical model	.324	.068	35
Other (previous campaigns and research)	.227	.048	44
Research Prior to campaign development			
None	.117	.086	16
Qualitative	.302	.049	52
Quantitative	.277	.067	34
Qualitative and quantitative	.396	.128	10
Qualitative and other research	.243	.053	35
Other (Experimental, Observation, Review of past campaigns and previous experience)	.207	.032	66
Total Sample	**.254**	**.028**	**157**

Pre or pilot testing of materials			
Yes	.228	.041	66
No	.171	.044	34
Not known	.333	.053	57
Media Used			
Television	.287	.036	105
Radio	.268	.040	97
Newspapers/magazines	.263	.032	86
Billboards	.253	.033	50
Pamphlets	.224	.028	64
Other	.212	.046	55
Television and Radio	.298	.049	71
Television, radio and newspapers/magazines	.240	.040	54
No television	.187	.041	52
Campaign Supports			
Publicity	.293	.036	107
Legislation	.214	.033	111
Enforcement	.315	.060	52
Legislation & enforcement	.313	.064	49
Legislation & publicity	.257	.046	74
Publicity & enforcement	.363	.072	42
Other	.223	.050	33
Total Sample	**.254**	**.028**	**157**

Media Characteristics			
Media Usage			
Continuous	.236	.039	78
Bursts on and off	.253	.079	22
Execution			
Single Ad	.129	.044	25
Multiple Ads	.257	.034	108
Spokesperson			
Voiceover alone	.500	.085	19
Expert	.195	.070	8
Celebrity	.179	.056	16
Peer alone	.073	.079	11
Combination (usually peer and voiceover)	.129	.047	21
None	.130	.081	14
Message Characteristics			
Educative/information oriented	.209	.033	97
Reinforcing/carry on	-.088	.032	4
Requesting or instructing change or modify behaviour	.320	.041	48
Not stated	.578	.288	7
Appeal Emphasis			
Positive	.260	.038	58
Negative	.271	.045	74
Not stated	.186	.070	25
Total Sample	**.254**	**.028**	**157**

Authority	.202	.038	58
None	.267	.039	63
Not stated	.308	.057	38
Social Proof	.223	.048	48
None	.262	.033	48
Not stated	.272	.055	61
Rational	.229	.027	115
Emotional	.428	.113	23
Not stated	.194	.076	19
One sided argument	.260	.030	138
Two sided	.268	.045	4
Not stated	.193	.082	15
Direct at me	.271	.033	125
Indirect	.185	.042	20
Not stated	.191	.104	12

Authors Conclusion			
Definite Success	.392	.042	80
Success (Guarded)	.156	.034	51
No impact or negative impact	-.036	.042	22
Report type			
Book	.232	.083	17
Journal	.327	.063	22
Report	.241	.041	82
Conference proceedings	.318	.078	21
Other-published	-.102	.192	2
Other-unpublished	.297	.047	7
Total Sample	**.254**	**.028**	**157**

Study Design			
No control	.277	.039	92
Control used	.221	.038	65
Base Level of knowledge/attitude/behaviour			
80%+	.155	.075	18
60-80%	.147	.147	21
40-60%	.209	.042	42
20-40%	.289	.052	30
<20%	.359	.070	46
Country			
Australia (including whole of Australia and parts of States	.289	.041	70
USA	.186	.066	33
Europe	.230	.060	29
Other	.271	.069	25
Total Sample	**.254**	**.028**	**157**

The results indicate that the base level has a substantial impact on the effect sizes and this is examined in more detail in the next section.

4.54 *Comparison of the Base Level Impact on Effect Size*

To explore the consistency of the relationship between the base level and impact size indicated in the previous section, mean d values were calculated for some specific subgroups. These were campaigns where the base level of population was below 40% compared to the subgroup where the level was above 40%. Also, because of their special interest, Australian campaigns were treated as a subgroup to ensure the major findings were consistent.

The small samples limit this analysis and increase the likelihood of spurious results. The results appear in Table 18 and contain the mean d values for three sub groups:

- Australian campaigns,
- Campaigns with a base level ≤40%,
- Campaigns with a base level > 40%.

The mean d values are shown for each subgroup with the standard error of the mean estimate in brackets and the sample size shown.

The overall mean d value for the subgroups are shown below:

Total sample	d = .254 SE = (.028) N = 157
Total Australian	d = .289 SE = (.041) N = 70
Base level ≤40%	d = .333 SE = (.046) N = 77
Base level >40%	d = .177 SE = (.029) N = 80

Overall the results for the subgroups confirm some of the findings summarised earlier. Some specific observations can be made from Tables 18.

* Where the starting point is below 40% much greater effect sizes emerge than when the base is over 40% as noted previously and as indicated by the d values above.

* A theoretical model approach to campaign development appears to lead to higher effectiveness.

* Prior qualitative research is associated with higher effectiveness especially when the base level is below 40%. Prior quantitative research is also helpful but far less so above the 40% base level. Most importantly, there is a strong relationship between campaign effect sizes for Australian campaigns which use prior qualitative research versus those Australian campaigns which used no research.

* A persuasive campaign orientation also appears to have a positive impact although not where the base level is above 40%. Campaigns requesting a change or modification in behaviour rather than being educative or information oriented appear generally more successful although this is not confirmed in the Australian campaigns.

* Enforcement as a campaign support is associated with effectiveness but the presence of legislation by itself is not. In most cases (about two thirds) legislation was present. It is the combinations of enforcement plus publicity and legislation and enforcement that are most effective.

* The type of media used does not clearly show the power of television, although as noted earlier the correlation between television usage and effect size, as for multiple ads, may be more a measure of the reach of the campaign.

* Emotional appeals are associated with much higher effect sizes but only when the base level is under 40%.

* Negative appeals show inconsistent results. They are associated with higher effect sizes when the base level is low (less than 40%) but when the base level is over 40% positive appeals are associated with higher d values (effect sizes).

The reduced sample size for each of the subgroups considered (Australian, base level below 40% and above 40% groups) mean that the above conclusions are limited. The standard errors are correspondingly large. The consistency of the results is also limited when the base level is over 40%.

Table 18 (5 pages)

Mean d values by Australia and by Base Level

	Total	Aust	Base Level	
			≤40%	>40%
Campaign Orientation				
Educative	.210	.277 (.043) 46	.291 (.056) 47	.147 (.034) 61
Persuasive	.355	.364 (.138) 15	.467 (.121) 18	.153 (.077) 10
Basis of Campaign Development				
None	.141	.173 (.057) 14	.110 (.071) 6	.153 (.060) 16
Intuitive - Yes	.193	.183 (.045) 13	.379 (.121) 4	.163 (.044) 24
Intuitive - No	.242	.263 (.042) 45	.287 .048 57	.183 .044 44
Theory - Yes	.324	.333 (.106) 13	.418 (.091) 23	.143 (.069) 12
No Theory	.197	.219 (.032) 45	.217 (.044) 38	.183 (.037) 56
Other - Yes	.227	.282 (.055) 18	.217 (.054) 28	.244 (.094) 16
Other - No	.234	.228 (.043) 40	.357 (.069) 33	.155 (.031) 52
Total intuitive theoretical and other	.250	.268 (.041) 44	.313 (.049) 55	.183 (.038) 52
Total Sample	.254	.289	.333	.177

Research Prior to Campaign Development				
Qualitative - Yes	.302	.367 (.063) 25	.336 (.057) 35	.231 .093 17
Qualitative - No	.166	.134 (.027) 31	.278 .072 27	.090 (.030) 40
Quantitative - Yes	.277	.462 (.172) 7	.511 (.098) 17	.043 (.045) 17
Quantitative - no	.204	.206 (.031) 49	.235 (.045) 45	.170 (.046) 40
Other - Yes	.207	.208 (.025) 39	.218 (.039) 33	.196 (.052) 33
Other research - no	.248	.308 (.101) 17	.417 (.081) 29	.044 (.040) 24
Some research done	.242	.269 .037 49	.327 .048 52	.155 .038 51
Pre or Pilot Testing of Materials				
Yes	.228	.252 (.054) 34	.264 (.051) 41	.168 (.066) 25
No	.171	.190 (.042) 14	.303 (.084) 13	.089 (.042) 21
Total Sample	**.254**	**.289**	**.333**	**.177**

Media Used				
Television	.287	.307 (.052) 54	.370 (.059) 52	.205 (.038) 53
Radio	.268	.306 (.065) 43	.342 (.065) 50	.189 (.045) 47
Newspaper/ Magazine	.236	.268 (.037) 45	.349 (.054) 39	.192 (.034) 47
Billboards	.253	.251 (.027) 20	.374 (.049) 24	.140 (.033) 26
Pamphlets	.224	.183 (.029) 34	.316 (.054) 25	.166 (.027) 39
Campaign supports				
Publicity	.293	.312 (.050) 53	.370 (.070) 51	.208 (.038) 56
Publicity - none	.080	.107 (.051) 12	.120 (.084) 14	.053 (.035) 20
Legislation	.214	.247 (.054) 45	.292 (.071) 41	.168 (.032) 70
Legislation - none	.322	.307 (.104) 10	.353 (.070) 25	.195 (.130) 6
Enforcement	.315	.357 (.100) 22	.503 (.139) 17	.223 (.054) 35
Enforcement - none	.213	.219 (.032) 45	.266 (.043) 51	.151 (.030) 44
Other - none	.246	.302 (.049) 48	.301 (.053) 56	.194 (.036) 59
Legislation & Enforcement	.313	.359 (.116) 19	.537 (.169) 14	.223 (.054) 35
Total Sample	**.254**	**.289**	**.333**	**.177**

	Total	Aust	≤40%	>40%
Legislation and Publicity	.257	.273 (.072) 33	.376 (.106) 25	.197 (.042) 49
Publicity and Enforcement	.363	.399 (.128) 17	.518 (.147) 16	.268 (.068) 26
Message Characteristics				
Educative /Information Oriented	.209	.288 (.045) 44	.306 (.057) 40	.142 (.036) 57
Requesting change/ Modify behaviour	.320	.266 (.033) 20	.351 (.061) 30	.267 (.042) 18
Appeal Emphasis				
Positive	.260	.206 (.034) 28	.259 (.049) 35	.263 (.064) 23
Negative	.271	.353 (.077) 33	.412 (.084) 33	.158 (.037) 41
Authority	.202	.305 (.094) 22	.382 (.152) 16	.129 (.034) 40
None (Authority)	.267	.236 (.045) 37	.293 (.050) 38	.228 (.062) 25
Social Proof	.223	.228 (.054) 30	.231 (.060) 28	.211 (.080) 20
None (Social Proof)	.262	.227 (.035) 23	.337 (.057) 21	.204 (.035) 27
Rational	.229	.241 (.032) 53	.274 (.045) 51	.192 (.033) 64
Emotional	.428	.563 (.220) 10	.626 (.145) 15	.057 (.078) 8
Total Sample	**.254**	**.289**	**.333**	**.177**

Author's conclusions				
	Total	Aust	≤40%	>40%
Definite Success	.392	.412 (.059) 41	.502 (.065) 41	.277 (.045) 39
Success Guarded	.156	.158 (.040) 23	.178 (.058) 25	.134 (.037) 26
Control				
No control	.277	.328 (.056) 49	.398 (.064) 48	.146 (.033) 44
Control used	.221	.198 (.042) 21	.226 (.057) 29	.216 (.051) 36
Base level of Knowledge				
≤40%	.333	.400 (.085) 30	.333 (.046) 77	-
>40%	.177	.206 (.029) 40	-	.177 (.029) 80
Type of Campaign				
Seatbelts	.257	.271 (.061) 20	.314 (.086) 17	.212 (.048) 22
Drink/ Driving	.225	.243 (.063) 35	.269 (.065) 42	.174 (.051) 36
Total Sample	.254	.289	.333	.177

4.6 Regression Analysis

4.61 Base Level Impact

One of the problems already noted is that the base level of knowledge/attitudes/behaviour prior to the campaign has a definite impact on the size of the improvement that may be anticipated. For the total sample (awareness included) the regression relationship was estimated as:

d value = .570 - .006 x base level % (see section 4.22)

This suggests that a 10% change in the base level (say from 50% to 60%) reduces the impact that might be expected by .06.

When the awareness effect size measures are excluded the relationship was estimated as:

d value = .313 - .002 x base level (%)
$p<.02$ $R^2= .050$

For the Australian studies the model suggested is:

d value = .377 - .002 x base level %
$p <.07$ $R^2 = .050$

While the results of the preceding sections note that other moderator variables are important the base level of the target group has a clear and fairly consistent impact on the campaign results. In terms of percentage improvement the corresponding models for the sample excluding awareness and for the Australian subgroup:

Total % Improvement = 9.319% - .066 x base level %
$R^2= .046$ $p <.01$
Australia % Improvement = 10.550% - .063 x base level %
$R^2= .041$ $p <.10$

To investigate the combination of moderator variable impacts some stepwise regression modelling was performed. The results of this multivariate analysis are given in the next section.

4.62 *Moderator Variable Combinations*

The Glassian approach of using regression analysis to identify relationships of interest has limitations as noted by Fox, Crask and Kim (1988). There are also substantial problems of:

- missing data which reduces the number of observations dramatically;

- concern about multi-collinearity amongst the predictor variables.

As well there is the violation of the assumption of independence when the observations are effect sizes and not single studies. However, the approach provides some confirmation of observations made in preceding sections.

Stepwise regression procedures were used to estimate the combined effect of the base level and other moderator variables. Moderator variables were excluded if their regression coefficient was not significant at the 10% level (two-sided). The stepwise procedure meant that moderator variables were excluded if they did not add predictive power.

Campaign Supports

The base level variable had a value close to 0 and was excluded when the campaign supports of publicity, legislation, and enforcement were considered. The result was:

$$d = .627 - .192 \text{ Publicity} - .091 \text{ Enforcement}$$

$$R^2 = .089 \quad p = <.01 \quad n = 116$$

This suggests that the absence of publicity reduces the expected d value by twice as much as does the absence of enforcement. (The dummy variables codes used were 1 = present, 2 = absent). Legislation by itself was not included in the model but of course cannot be considered unimportant. As noted earlier it was present in the large majority of campaigns.

The model indicates that where publicity and enforcement are both present the expected d value is .334 compared to .061 when they are both absent. This is consistent with the results in Table 18 although some 40 odd cases are excluded from the model above because of missing values.

Prior Research

The moderator variables covering qualitative and quantitative research and their combination were considered. The result was:

$$d = .244 - .022 \times \text{base level} + .124 \times \text{Qualitative research}$$

$$R^2 = .093 \quad p<.01 \quad n = 114$$

(The codes for qualitative research were 1 = yes, 0 = no).

This result confirms the specific value of qualitative research. Its use appears to add around .124 to the effect size that might be expected without this research. A specific impact for quantitative research was not isolated.

Media Weights

When models were fitted using the usage of the various media only the usage of television showed a specific effect. The model was:

$$d = .259 - .002 \times \text{base level} + .084 \text{ TV used}$$

$$R^2 = .053 \quad p <.02 \quad n = 150$$

The usage of TV may be related to campaign reach or intensity as suggested earlier. The above model suggests its useage adds around .084 to the effect size. The statistics show this media is used in some two thirds of campaigns.

Appeal Emphasis

In modelling attempts to relate impact size to the base level and all appeal types no specific appeal type was identified. This was due to the presence of missing values and not to the absence of an effect for specific appeal types. When individual appeal types were considered the impact of emotional appeal is to add .199 to the effect size:

$$d = .029 + .199 \times \text{Emotional Appeal (versus rational)}$$

$$p < .01 \quad R^2 = .045 \quad n = 138$$

No relationships with other appeal types and effect sizes were established.

These regression analyses confirm some of the observations made earlier. The magnitude of the missing value problem due to variables not being reported in the literature limited the extent to which these aspects could be persued. It was not practical to consider further combinations of moderator variables.

5.0 *Some Key Conclusions*

This report represents a more scientific attempt to synthesise the results of a large number (87) of evaluated road safety mass media campaigns. Meta-Analysis provides a more rigorous approach to synthesis by statistically attempting to develop generalisations across all campaigns. However the quality of the available data (usually a lack of reporting) diminishes the power of the Meta-Analysis when looking at some campaign characteristics. Accordingly, some conclusions carry more weight than others.

1. Many (perhaps most) road safety mass media campaigns are not evaluated or else evaluated in a primitive form such as post-only and frequently only awareness of the campaign materials.

2. Detailed accounts of case studies involving evaluated road safety campaigns are unlikely to be published in journals and most likely to be kept as internal reports by Authorities.

3. The standard of reporting of evaluated campaigns is characterised by a lack of campaign details and an emphasis on the evaluation.

4. Campaigns in Australia have resulted in a greater impact than for the rest of the world and this reflects Australia's use of mass media as a support for other activities aimed at more directly influencing safe road behaviours.

5. When measuring the outcome/impact of a mass media campaign, measures of awareness provide a proxy for exposure to the campaign rather than a measure of change in the road user. Campaigns, on average, should aim for at least a 30% + increase in awareness.

6. The average impact (mean effect size) across all campaigns and all outcome measures combined (awareness, knowledge, attitudes, behaviour) was 7.56%, i.e., a campaign is expected to achieve an improvement of 7.56% on the pre campaign measure. When awareness is excluded the average gain is 6.1%.

7. Whilst awareness should increase by 30%+, increases in attitudes and behaviour are much lower. The resistance of attitudes, intentions and behaviour to mass media campaigns is in keeping with expectations from the mass media effects literature and the attitude change literature.

8. The base level upon which the campaign has to build also influences the level of change. Campaigns starting with a low base level can be expected to achieve a much greater change than those starting at a high base. If the base level is zero then a campaign should, on average, achieve a 9% increase on the pre-measure of anything other than awareness. At the 50% base level the expected improvement is 6% and at the 80% level only a 4% improvement can be expected.

9. Campaigns which start with a base level below 40% have much greater effect sizes than campaigns where the base is over 40%.

10. Campaigns which use publicity and enforcement on average result in an increase of 8.5% on the base rate versus only 1.3% increase where campaigns do not use any publicity and enforcement.

11. Publicity seems to be even more important than enforcement since the absence of publicity reduces the impact (expected d values) by twice as much as does the absence of enforcement.

12. Qualitative research is strongly associated with increased impact (effect sizes) and is more important than quantitative research.

13. Prior qualitative research is associated with greater increases, especially when the base level is below 40%.

14. Australian campaigns which use qualitative research as a basis for campaign development have higher effect sizes.

15. Television is associated with higher effect size. However, this may be a proxy for greater reach of the target. It should be noted that unfortunately no measures were available of campaign intensity.

16. Emotional campaigns have a greater impact that information (rational) campaigns but only when the base level is less than 40%.

17. Negative appeals are more likely to achieve higher effect sizes when the base level is below 40%.

18. Positive appeals are more effective when the base level is over 40%.

19. Persuasive rather than informative approaches are more effective when the base level is below 40%.

20. Campaigns requesting a behaviour change or modification are more successful than educational informational campaigns.

21. Campaigns with a theoretical basis (research or a priori) are more successful than campaigns based on intuition.

22. The use of a voiceover is associated with successful campaigns whereas using experts or celebrities is not.

23. There is some evidence of a "*file-drawer*" problem in that campaign evaluations published in journals or conference proceedings are likely to have higher effect sizes.

24. The use of a control group in campaign evaluation is associated with a reduction in campaign effect size; i.e., in accordance with scientific evaluation the absence of a control group appears to overstate somewhat the campaign effects, especially for Australian campaigns.

6.0 References

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RS5 Phillips, N. and Maisey, G. (1989) *Public posting of speeding information in urban areas.* Research and Statistics Section, Western Australian Police Department.

$RS6_{A-C}$ Rooijers. T. (1988) Effects of different public information techniques in reducing driver speed. In Rothengatter, T. & de Bruin, R. (eds) *Road User Behaviour: Theory and Research,* Van Gorcum Assen/Maastrict The Netherlands.

NB* Unable to use this case in the meta analysis as results given in the form of a reduction in casualties.

Bicycle Helmet Campaigns

RH1 Transport Tasmania (1988) *Bicycle helmet publicity.* Office of Road Safety. Transport Tasmania.

RH2 Wood, H.T. and Milne, P. (1985) *Bicycle Helmets save lives - the promotion of helmet use in Victoria, Australia.* Road and Traffic Authority, Victoria.

RH3 DiGuiseppi, C.G., Rivara, F.P., Koesell, T.D. ad Polissar, L. (1989) Bicycle helmet use by children: evaluation of a community-wide helmet campaign. *Journal of the American Marketing Association,* 262, 16, 2256-2261.

RH4 Wise, A. (1989) *Evaluation of the 1988 'Helmet Heroes' Bicycle helmet campaign.* Hawthorn Victoria: VIC Roads. Road Safety Divisions.

Appendix 1

Main Coding Form

1

Meta Analysis Coding Sheet - Section A
(Circle numbers or put in number as requested)

Q1. (Category)

	Road Safety		Health		Other
1	Seat belts/restraints	6	Alcohol	15	Energy/Water Conservation
2	Alcohol/RBT/D.D.	7	Drugs	16	Quarantine
3	Speeding	8	Food/nutrition	17	Litter
4	Helmets	9	Smoking	18	Crime/vandalism
5	Other	10	Heart	19	Safety/general
		11	Cancer	20	Other .....
		12	Aids		
		13	General		
		14	Other		

Author(s)_____

_____

Q2. Year of Publication: 19 __

Title:_____

_____

_____

Source:_____

_____

_____

_____

Q3. Form

1 Book
2 Journal
3 Report
4 Conference/Proceedings
5 Other - published
6 - unpublished

Q5. Duration of New Behaviour

1 one off
2 intermittent
3 regular/continuing
4 NS
5 Not relevant/no behaviour change.

Q.4 Campaign Goals

1 _ Awareness
2 _ Knowledge
3 _ Attitude/Motivation
4 _ Behaviour
5 _ Other _____
6 _ Not stated

NB each goal must be given a number
0 = not applicable 1 = primary
2 = secondary
If 1-5 then 6 = 0, if 6 then it is = 1.

Duration and Timing and Location

Q6. Geographic Area

1 Australia
2 One Australian State only
3 Parts of some Australian States - 2 Aust States - part only
4 U.S.
5 Europe
6 Other
7 N.S.

Q7. Year of Campaign 19 __

Q8. Duration

Number of weeks __
If more than 52 weeks still translate into weeks
If more than 99 treat as 99
NS = 00

Q9. Supports for mass media campaign. Write in no. 1 = Yes, 2 = No, 3 = Already Existing, 4 = Don't Know. If None write 1 in None.

1__None
2__Publicity/PR
3__Legislation
4__Enforcement
5__Brochures/videos etc.
6__Behavioural supports/response channels
7__Other _____
8__Incentive
9__Not stated

Q10. Campaign Orientation

1 Educative (information orientated)
2 Persuasive (emotional etc)
3 Social marketing context specified.
4 Other _____
5 N.S.

Q11. Basis of Campaign development

1 None given
2 Intuitive
3 Theoretical model
4 Other _____
5 N.S.

Q12. Research prior to campaign development

1 None
2 Qualitative
3 Quantitative
4 Observation
5 Experimental
6 Review of past campaigns
7 Previous experience
8 N.S.

Q13. Pre-Testing/Pilot testing write in no.

1 = Yes, 2 = No, 3 = Don't know.

1___ Pre-testing of materials
2___ Pilot testing in an area

Q14. Target Audience

Number of Target Audiences

1 Single Target
2 Multiple Targets (i.e. different age groups etc.)
3 N.S.

Q15. Target Unit

1 Individuals
2 Families/households
3 Parents/Peers
4 Other
5 N.S.

Q16. General Unit

1 Specific problem users e.g. smokers, dangerous drivers.
2 General users - all drivers
3 General community but one specific category e.g. parents
4 Everybody
5 N.S.

Q17. Age, write in number 1 = Primary, 2 = Secondary If N.S. then = 1

1___ <12
2___ 13-18
3___ 18-25
4___ 25-35
5___ 35-50
6___ 50-65
7___ 65+
8___ All adults
9___ All children
10___ All young persons
11___ Everybody
12___ N.S.

Q18. Sex

1 Male
2 Female
3 Both
4 N.S.

Campaign Content

Q19. Media Write in number, 1 = Primary, 2 = Secondary, 0 = not used
If N.S. write in 1.

1___ TV
2___ Radio
3___ Newspaper/magazines
4___ Billboards
5___ Pamphlets
6___ Other
7___ N.S.

Q20. Media usage

1 Continuous over campaign period
2 Bursts/on-off-on-off
3 N.S.

Q21. Execution

1 Single ad
2 Multiple ads
3 N.S.

Q22. Spokesperson

1 Voiceover
2 Expert
3 Celebrity
4 Peer
5 None used
6 Insufficient information
7 Other _____.

Q23. Music

1 Yes
2 No
3 N.S.

Q24. Humor

1 Yes
2 No
3 NS

Q25. Characteristics of message

1 Educative/information oriented
2 Re-inforcing/carry on
3 Requesting or instructing change/modify behaviour
4 Requesting or instructing new behaviour
5 N.S.

Q26. Appeal Emphasis write in 1 or 2 or 3 (N.S.)

___ Positive (1) or negative (2)
___ Authority (1) or none (2)
___ Social proof (1) or none (2)
___ Rational (1) or emotional (2)
___ One sided argument (1) or 2 sided (2)
___ Direct (at me) (1) or indirect (via others) (2).

Section A - Comment Page

1. Campaign Objectives/Characteristics

Goals_____

_____

_____

2. Duration/Timing/Location

Additional Marketing Effects_____

_____

Campaign Orientation _____

_____

3. Target Audience

Target Audience _____

_____

Section B

Campaign Effectiveness

Q27. Number of success measures

___ Awareness 1 = 1, 2 = 2 etc. 0 = not measured
___ Knowledge/Education
___ Attitude/Motivation
___ Behaviour
___ Other

Q28. Measure type

1 Pre-Post
2 Control group - pre/post
3 Control group post only

Q29. Type of instrument

1 Observation
2 Survey-mail
3 Survey-telephone
4 Survey-Face to face
5 Other
6 N.S.

Q30. Author's Conclusions:

1 definite success
2 success (guarded)
3 no impact
4 negative results
5 N.S.

Q31. Sample Size

1 Exact sample size given
2 Sample size calculated
3 Sample size assumed

Results:

1. Up to 20 measures only are allowed but no more than three for any one type of measure i.e. 3 awareness, 3 knowledge, 3 behaviour, 3 attitudes, 3 motivation etc. where there is more than one measure say on awareness then up to three can be used. These three must be "best" result, "worst" result and "average" of all results. Such measures can be collected at more than one point in time.

2. Where there are different locations then first combine them (i.e. average) and then look at results - use the combined sample size.

3. Where sub-groups are used provide (a) total result and (b) target audience result primary or (c) secondary, ignore sex/age sub-groups unless they are a specific primary target.

4. Where measures are taken at multiple periods code as short term (soon after); medium term 3 mths-12 mths later; longer term after 12 months.

5. Code on next page as follows:

Category of Measure (Q33)
1 = awareness of campaign
2 = awareness of campaign issue/ campaign content
3 = knowledge about issues
4 = attitude/interest
5 = motivation/intention
6 = behaviour - self report
7 = behaviour = observed/measured
8 = Other (specify) ____

Summary of Not (Q35)
1 = Summary i.e. combining areas
2 = Actual no summary

Scientific Status (Q34)
Pre-Post Data only = 1
Post only. Control is used for pre = 2
Control used to adjust post measure = 3

Measurement Period (Q36)
Short term = 1
Medium term = 2
Long term = 3 (12 months or more after campaign)

Type of Measure (Q37)

Actual	1
Best	2
Worst	3
Average	4
Middle	5

Q32. Number of Measure _ Results: Measures of Success

	Q33 Type of Measure 1-8	Q34 Pre Post Control 1 or 2	Q35 Summary or Not 1 or 2	Q36 Time Period after	Q37 Type of Measur 1-4	Q38 N Pre	Q39 N Post	Q40 Pre % (1 dec)	Q41 Post % (1 dec)	Q42 Control diff b/w pre & post	Q43 (Q41-Q42) Post % adjusted for control	Q44 Difference (1 dec)	Q45 T Value (4 dec)	Q46 D Value (4 dec)
1	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
2	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
3	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
4	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
5	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
6	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
7	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
8	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
9	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
10	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
11	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
12	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
13	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
14	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
15	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
16	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
17	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
18	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
19	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----
20	_	_	_	_	_	----	----	--.-	--.-	--.-	---.----	--.-	-----	---.----

Comments for each record (1-20) detail the question or measure e.g. awareness of TV ad or aware AIDS is dangerous etc.

1. _____

_____

2. _____

_____

3. _____

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4. _____

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5. _____

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11. _____

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12. _____

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13. _____

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14. _____

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15. _____

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16. _____

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17. _____

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18. _____

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19. _____

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20. _____

_____

Appendix 2

Effect Size Calculation

Effect Size Calculation

The effect size d was calculated for each study by firstly calculating this t value for the difference between proportion and then deriving the d value. This procedure was suitable for the pre and post type measures given in term of for example the proportions wearing seat belts. The form of the calculation was;

$$t = \frac{P1-P2}{S}$$

where P1 = post campaign proportion seat belt wearing

P2 = pre campaign proportion

S = pooled standard error

$$= \frac{(n_1 s_1^2 + n_2 s_2^2)}{(n_1 + n_2)}$$

where

$$S1 = P1 \frac{(1 - P_1)}{n_1}$$

$$S2 = P1 \frac{(1 - P_2)}{n_2}$$

The d value was derived using the relationship given by Glass (1976)

It should be noted that in some of the studies a control group was used. In calculating the T statistics in these cases the net percentage changed was calculated.

P = increase in proportion wearing seat belts

= (P1-P2) - (p1 - p2)

where

p1 = control pre proportion

p2 = control post proportion

A conservative approach was taken by not increasing the degrees of freedom represented by the control group. In most cases the control group had limited impact on the estimated change in proportion but in some cases caused a negative net impact.

Kulik and Kulik (1989) note that the use of a correction for d suggested by Cohen (1977):

$$d^u = 1 - \frac{3}{4(n_e + n_c - 2) - 1} \quad d$$

This has generally had a trivial effect (p244) and was therefore not used.

Glass has recommended the use of probit analysis for data of this type where the experimental outcome is dichotomous (for example wearing or not wearing seat belts). Using the probit table this method of calculating d values was used as a check. In almost all studies, the d value estimated using the probit approach was virtually identical to that provided by the t value approach.

The probit calculation involves simply changing the proportions to scores and using the difference between experimental and control groups 2 scores as effect size.

In some cases fatality or other casualty accident data was available before and after a campaign. The effect size (E.S.) for these studies was calculated, somewhat crudely by assuming the number of accidents was a Poisson variable. The standard deviation was estimated and effect size calculated as;

$$\text{E.S.} = \frac{\text{(Before Accidents Mean) - (After Accidents Mean)}}{\text{Estimated standard deviation}}$$

No attempt was made to correct for overall trends in accident rates using regression.

It should be noted that in some instances "after" measurements were made during the process of the campaign. Where an improvement seemed apparent these measurements were considered as post values.

Probit Table

Proportion	Expected Probit
.500	5.00
.520	5.05
.540	5.10
.560	5.15
.579	5.20
.599	5.25
.618	5.30
.637	5.35
.655	5.40
.674	5.45
.691	5.50
.875	6.15
.885	6.20
.894	6.25
.903	6.30
.911	6.35
.919	6.40
.926	6.45
.933	6.50
.9394	6.55
.9452	6.60
.9505	6.65
.9599	6.75

Appendix 3

Characteristics of Studies Used in the Main Analysis

Characteristics of Studies Used: Main Analysis

In the main analyses some 69 studies involving 157 effect sizes were considered. This subset of studies excludes more than one effect size for any outcome varible if the same campaign was conducted in different geographic areas at a different point in time. It also excludes studies involving only awareness measures. The summary statistics of (numbers) campaign characteristics (not effect sizes) are provided in the following pages.

Type of Campaign	
Vehicle restraints	23
Drink driving	25
Bike Helmet	4
Speeding	6
General Road User	11
Total	69
Country	
Australia/Part of Australia	31
US	13
Europe	13
Other	10
	69
Year of Study	
Pre 1975	13
1975-80	17
Post 1980	27
	69

Duration	
6 weeks or less	30
8-20 weeks	21
20-50 weeks	8
over 50 weeks	6
Not stated	4
	69

Campaign Support			
	Yes	*No*	*Not Stated*
Publicity	49	12	8
Legislation	47	18	4
Enforcement	29	35	5
Other	15	49	5

Campaign orientation	
Educative	41
Persuasive	13
Social Marketing	2
Other	8
Not stated	5

Basis of Campaign Development			
	Yes	*No*	*Not stated*
None	9	47	13
Intuitive	42	14	13
Theoretical model	20	36	13
Other	13	43	13
Research done none	9	43	17
Qualitative	20	32	17
Quantitative	18	34	17
Other	22	30	17
Pre testing or piloting	22	17	30

Media used		
	Yes	*No*
TV	46	23
Radio	41	28
Newspapers/ magazines	40	29
Billboards	25	44
Phamplets	26	43
Other	17	52

Message Characteristics	
Educative/reformation oriented	36
Re-inforcing/carry on	1
Requesting or instructing change/ modify behaviour	25
Requesting new behaviour	1
Not stated	6

Appeal Emphasis

Positive	Vs	Negative	Not stated
20		35	14
Authority	vs	None	
24		25	20
Social Proof	vs	None	
15		21	33
Rational	vs	Emotional	
47		12	10
One sided	vs	Two sided	
56		4	9
Direct	vs	Indirect	
51		10	8

Campaign Execution		
Single ad	Multiple ad	Not stated
11	45	13
Continuous	Burst on and off	
38	10	

Spokesperson	
Voice over alone	10
Expert	2
Celebrity	5
Peer	5
None	8
Combination of voice over/peer etc	6
Not stated	33

Author's Conclusion	
Definite success	39
Success guarded	18
No impact	9
Negative results	1
Not Stated	2
Control Used	
Yes	24
None	45

Appendix 4

Campaign Summary Statistics

Restraint Campaigns

Study	Country	Duration (weeks)	Pre	Post	pre%	Increase	D value	Measure	
RB1	Australia 90	2	174	174	51.4	1.0	.0282	Adult seat belt use	Wallington-Jones
RB3	US 83	29	700	700	24.0	12.3	.3822	Adult seat belt use	Campbell et al
RB4	Australia 91	4	1775	2134	75.1	6.3	.2175	Rural usage	ARUP
RB5	Australia 89	4	3000	3000	58.0	10.0	.2945	Child usage	TAS. O.R.S.
RB6	Australia 87	18	151	281	80.0	6.0	.2371	Average usage by .08 year olds from and rear (6 weeks after)	Bowler & Torpey
RB8	Australia 81	-	3077	3168	39.0	34.0	1.1005	Rear seat passenger usage (1 month after)	Lane et al
RB9	Australia 79	13	240	272	0.0	2.2	.3000	Front seat usage by a month - 4 year olds	Wood
RB10A	US 84	14	419	678	8.1	-.7	-.3081	Driver usage	Cope et al
RB10B	US 84	2	678	3025	7.4	11.0	.6081	Driver usage	
RB11A	Europe 71	6	6075	6075	14.0	6.0	.2442	Front seat usage	Levens & Rodnight

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	Measure	
RB11B	Europe 72	9	6075	6075	12.9	13.1	.5034	Front seat usage	Levens & Rodnight
RB11C	Europe 72	9	6075	6075	12.7	7.4	.3013	Front seat usage	
RB11D	Europe 72	9	6075	12150	19.0	10.7	.3769	Front seat usage (All RB11 4 months after)	
RB12	Australia 79	16	1000	1000	40.0	15.5	.4440	Children 0.8 in approved decisions 2 months after	Freedman & Lukin
RB13	Australia 84	-	13449	13881	75.6	7.8	.2747	Adult Front Seat	Traffic Authority NSW
			12781	13881	30.9	16.0	.4708	Adult Rear Seat	
			13449	13881	51.2	19.1	.5644	Children restrained	
			12800	13881	52.6	14.3	.4366	Average front and rear	
RB14	Australia 89	5	26620	31866	84.9	4.2	.1777	Usage by all occupants (metro and rural adults and children)	Wise & Healy
*RB16A	US 76	1	978	1866	15.5	23.3	.8079	Drivers leaving carpark restraint usage	Elman & Killebrew
RB16B	US 76	1	978	534	15.5	9.1	.3382	Drivers leaving carpark restraint usage	
RB16C	US 78	1	978	534	15.5	1.1	.0443	Drivers leaving carpark restraint usage	

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	Measure	
RB17A	US 71	5	1756	1453	16.3	-.6	-.1448	Seat belt usage	Fleischer
RB17B	US 71	5	3728	4057	11.8	-3.1	-.1448	Seat belt usage	
RB18	US 86	8	636	948	32.0	17.5	.5218	Front seat (23 weeks after)	Lund et al
RB19A	Australia 78	4	417	385	58.0	-5.0	-.1424	Child restraint usage where fitted	Broughton & Johnston
RB19B	Australia 78	4	456	411	54.0	-5.0	-.1417	Child restraint usage where fitted	
RB20A	Australia 73	2	3403	3420	61.0	5.9	.1741	People wearing seat belts tight - not loose	Johnston & Cameron
RB20B	Australia 73		3874	3107	57.1	.2	.0058	People wearing seat belts tight - not loose	
RB20C	Australia 73		2584	2743	48.2	15.4	.4501	People wearing seat belts tight - not loose	
RB20D	Australia 74		3043	3467	67.9	4.6	.1427	People wearing seat belts tight - not loose	
RB20E	Australia 74		2607	2819	52.9	7.3	.2090	People wearing seat belts tight - not loose	
RB20F	Australia 74		2511	2214	62.2	2.2	.0647	People wearing seat belts tight - not loose	
RB20G	Australia 74		3728	4101	58.7	-.4	-.0115	People wearing seat belts tight not loose	

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	Measure	
RB21	US 72	37	734	467	15.0	.5	.0202	Driver usage	Robertson et al
RB22A	US 85	3	1030	1266	49.0	16.5	.4807	Front seat usage	Williams et al
RB22B	US 86	3	765	765	66.0	.0	.0299	Usage 4 months after	
RB23	Australia 81	22	496	462	53.7	.4	.0113	Child (6 months - 7 years)	Cox & Fleming
RB24A	Canada 82	2	593	674	40.6	15.3	.4387	Seatbelt usage (after 2 weeks of campaign)	Watson
RB25	Europe 84	8	2869	2869	52.3	20.7	.6194	Driver usage (end of campaign)	Gundy
RB26	Australia 81	2	697	877	76.5	9.5	.3489	Child (0-8) usage	Lane et al

Additional Notes on some Restraint Campaigns

RB10 Campaign with two phases, the second including incentives

RB11 The Klink-Klunk campaign conducted in different areas

RB13 The Click-clack front 'n' back campaign focussed on child restraint usage in addition to adult usage

RB16 A very minor series of experiments with leaflets and warnings conducted in a carpark

RB19 Campaign conducted in different Australian states. Other measures on restraint availability and use of recommended rear seat for children were excluded.

RB20 A series of experiments in different Australian cities.

A	high intensity - short duration
B	low intensity - short duration
C	high intensity - short duration
D	high intensity - short duration
E	medium intensity - short duration
F	high intensity - long duration
G	medium intensity - long duration

Restraint Campaign Objectives

The restraint usage campaigns involved direct observations in vehicle occupant usage. There were two main campaign classes with one class covering adults and the other children although the target in both cases was on adults. The campaign measures ranged from a focus only on drivers to all behicle occupants in both front and rear seats.

The typical objectives were:

- to increase wearing rates amongst vehicle occupants including drivers and front and rear seat occupants;

- to increase wearing rates in rural areas;

- to increase correst usage (buckle position, not twisted, not loose) of seat belts;

- to increase usage of approved child restraints;

- to increase seating of children in rear positions.

A single measure of effectiveness was calculated for each campaign. In some cases this was the average of the best and worst results. This approach was taken partly because few studies allowed separate identification of occupants seating position and the timing of the measurement varied from immediately after the campaign to several months after. These factors and the fact that initially all campaigns sought to increase wearing rates in all postions suggests this approach was reasonable.

Drink Driving Campaigns

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	*Measure type*	Measure	
RD1	Australia 89	8	321	300	74.1	10.7	.3774	8	Perceived risk of breath test	Harrison
					49.6	6.8	.1929	8	Estimate of accident proportion caused by alcohol	
					37.7	9.3	.2671	8	Estimate of accidents caused by speeding	
RD2	Canada 72	5	2230	2780	97.0	.7	.1441	7	Proportion with BAC below limit	Farmer
					54.3	5.9	.2582	3	Proportion knowing correct limit	
					32.7	14.4	.5282	3	Proportion knowing safe no. of drinks	
					78.9	1.9	.0819	3	Proportion knowing impairment conditions	
RD3	Europe 77	14	595	613	4.3	45	1.6669	2	Ad recall*	Lee & Samuels
					45.8	-3.6	-.1026	6	Use of precautionary strategies	
					59.0	+2.0	-.0573	6	Proportion drinking and not driving	
RD4	US 72	52	180	180	5.0	6.0	.3138	2	Ad recall*	Waller & Worden
					24.0	16.0	.4910	3	Knowledge of alcohol content	

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	*Measure type*	Measure	
RD4	US 72	52	180	180	20.0	0.0	0.000	4	Attitude to safe limit	Wordon & Waller
					47.0	30.0	.9165	4	Attitude to personal limit	
					90.0	14.0	1.2692	7	% with BAC below limit	
RD5	US 72 - 75	99	513	513	93.0	1.0	.0573	3	Awareness of impact of empty stomach on BAC	Miles & Clay
					28.0	6.0	.1837	3	Awareness of coffee impact on BAC	
					29.0	9.0	.2706	3	Awareness of body weight impact	
RD6	Australia 84	8	1285	941	19.3	7.8	.2655	6	Proportion never drink driving	Transport Commission of WA
			907	671	66.4	5.7	.1769	6	Proportion using alternative transport	
			1105	796	41.9	4.5	.1300	6	Proportion avoiding drink driving	
			1055	794	11.1	2.1	.0918	3	Knowing alcohol content	
			911	715	25.3	2.9	.0931	3	Knowing alcohol content	
			1038	802	16.9	5.2	.1875	3	Knowing alcohol content	
			1318	968	83.1	6.4	.2674	4	Agreeing it is safest to drink nothing	
			1296	944	92.1	1.9	.1070	4	Disagreeing it is OK to drive over .05	
			1303	961	71.3	5.9	.1934	4	Disagreeing safe driving is related to holding ability	

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	*Measure type*		
RD7	Australia 88	10	400	401	43.0	7.6	.2158	6	Reporting not drink driving	
			400	401	34.3	48.2	1.5834	1	Ad recall*	
			.37	331	23.4	38.2	1.2992	2	Ad recall specific*	Harrison
			400	401	44.3	4.6	.1304	8	Perceived risk of notice	
			400	401	41.3	18.6	.5348	8	Perceived risk of test	
RD8A	Canada 77	6	300	300	29.0	51.0	1.6834	1	Ad recall for TV*	
					16.0	20.0	.6612	1	Ad recall for newspaper*	
					49.0	23.0	.4929	2	Awareness of legal changes	
					9.5	10.8	.4402	3	Knowledge of testing	
					9.5	-3.2	.1141	3	Knowledge of testing after 3 months	
RD8B	Canada 77	6	150	152	25.0	41.0	1.2735	1	Ad recall television*	Cousins
					16.4	15.6	.5221	1	Ad recall newspapers	
					41.8	20.7	.5971	2	Awareness of legal changes	
					13.2	11.1	.4050	3	Knowledge of testing	
					2.6	8.6	.4853	3	Knowledge of testing after 3 months	

Study	Country	Duration (weeks)	Pre	Post	Pre %	Increase	D Value	*Measure Type*	Measure	
RD9	Australia 87	52	24295	27077	7.0	-2.0	-.1194	7	Proportion of divers under limit	Qld Dept of Transport
RD10	Australia 73	8	1005	1025	58.0	8.0	.2338	1	Awareness of alcohol as a cause of accidents	Freedman et al
					24.0	10.5	.3285	3	Knowledge of legal limit	
					4.3	6.7	.3592	3	Knowledge of penalties	
					33.3	12.5	.3504	3	Knowledge of beer alcohol content	
RD11	Australia 74	10	1000	1000	20.5	16.5	.5241	3	Knowledge of legal limit	Freedman & Rothman
					28.8	3.7	.1135	3	Recognition that alcohol contributes to accidents	
					54.2	10.5	.3043	3	Perceived crash risk	
RD12	Europe 75	47	2190	3330	53.1	21.7	.6705	3	Knowledge of 'day after' situation	Norstrom
					96.6	-.2	-.0157	4	Attitude in drink driving	
					49.1	-3.5	-.0985	8	Perceived large risk of detection	
					79.2	5.1	.1873	8	Perceived risk of accident	
					92.0	.5	.0270	6	Reporting no drink driving in last 6 months	
					16.1	3.5	.1322	6	Report of intervention to prevent drink driver	

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	Measure Type	Measure	
RD13	Canada 73	4	1122	1120	18.9	.7	.0251	6	intervened to prevent drink driving	Pierce et al
					4.2	3.0	.1833	6	reported not driving after drinking	
					42.5	7.7	.2189	8	discussed drink driving	
					34.7	10.6	.3077	3	knowledge of legal limit	
RD14A	Australia 81	6	400	400	.3	42.6	1.7089	2	unaided recall	
			400	400	0.0	18.3	.9454	2	unaided recall of theme	Elliott et al
			401	399	64.2	4.8	.1439	4	rating of drink driving deterrents	
			365	373	84.9	8.0	.3626	4	attitude to prevention	
			334	365	26.2	12.3	.3749	5	proportion taking avoidance measures	
			334	365	20.4	0.7	.0244	6	report of intervention behaviour	
			191	199	61.3	14.0	.4294	6	reporting not driving after drinking	
			84	90	20.2	7.3	.2419	6	reporting not driving after drinking	

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	Measure Type	Measure	
RD14B	Australia 82	6	400	400	.4	42.7	1.7085	2	Unaided recall	Elliott et al
			400	400	.4	16.8	.8771	2	Unaided recall for theme	
			404	400	69.2	3.3	.1026	4	rating of drink driving elements	
			379	385	96.0	8.3	.5075	4	attitude to prevention	
			364	383	29.7	11.6	.3450	5	proportion taking avoidence measures	
			364	388	16.5	-3.7	-.1481	6	report of intervention behaviour	
			163	168	62.0	-1.1	-.0319	6	reporting not driving after drinking	
			74	74	24.3	.7	.0228	6	reporting not driving after drinking	Grunig & Ipes
RD15	US 82	16	110	81	46.0	-10.0	-.2909	6	discourage another from driving*	
					37.0	-11.0	-.3394	6	did not enter drink drive situation*	Mercer
RD16A	Canada 85	4	269	251	14.0	37.0	1.2145	2	aware of enforcement program	
					65.0	3.0	.0898	3	able to name one or more anti-drink driving group	
RD16B	Canada 85	4	276	250	8.0	8.0	.3506	2	aware of enforcement program	
					68.0	-10.0	-.2943	3	able to name one or more anti-drink driving group	

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	Measure Type	Measure	
RD17	US 85	9	217	193	20.0	17.2	.5479	3	knowledge of limit	Kovenock et al
					87.2	-1.2	-.0498	3	knowledge of penalty	
					82.0	-4.3	-.1517	3	awareness that coffee has no impact	
					13.3	3.8	.1498	4	believe less than one drink is risky	
					6.2	-5.8	-.4650	4	believe police consider one drink risky	
					20.3	1.9	-.0657	6	did not drink drive	
					37.8	-1.2	-.0351	6	intervened in drink driving situations	
					26.1	.8	.0256	6	refused to travel with drink driver	
RD18	Australia 82	4	202	199	54.0	-2.0	-.0565	5	% will not drink driver over .05	Australian Medical Association
			202	199	19.9	-2.8	-.1018	5	intention to use alternatives	
			443	454	30.0	-.7	-.0217	5	awareness of alterntive behaviour	
			210	195	57.0	-6.0	-.1703	6	have not driven over .05	

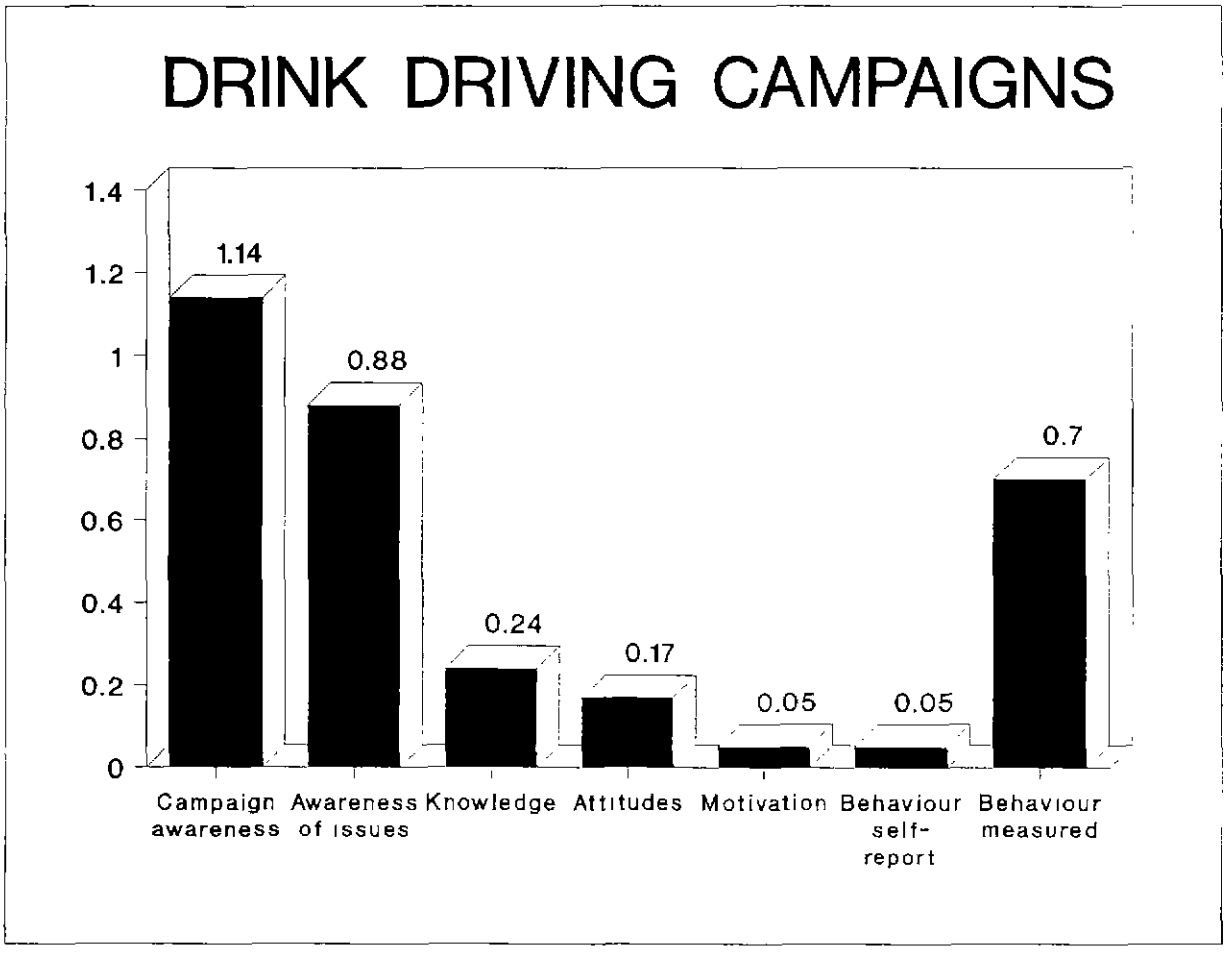
Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	Measure Type	Measure	
RD19A	NZ 78	4	600	700	-	-18.5	.9675	7	accident reduction	Hurst & Wright
RD19B	NZ 78	5	1000	1000	-	-21.8	1.0555	7	accident reduction	
RB20	Australia 83	10	1700	800	-	-49.0%	2.1458	7	accident reduction after RBT introduction	Amour & Monk
RD21	NS 84	6	2300	2500	-	-9.6%	+.7956	7	reduction in injury accidents	King
RD22	Australia 87	38	4002	3718	95.4	1.6	.1185	7	reduction in BAC under legal limit	King
RD23	Australia 88	52	2900	2600	-	1.5%	.0608	7	reduction in alcohol involved accidents	McLean et al
RD24	Australia 89	-	2878	2873	95.5	2.0	.1541	7	drivers with BAC under limit	Homel
RD25	Australia 86	6	175	175	44.4	-3.3	-.0941	6	Changed drink driving behaviour	Homel
RD27	US 86	26	206	800	28.1	3.5	.1334	6	changed in drink driving behaviour	Murry et al

Drink Driving Campaigns Objectives

The drink driving campaigns frequently had a complexity of goals. They were generally targeted at specific problem users recognised as males under 30 years of age. The range of objectives is were:

- to increase the perceived risk of detection for drink driving;
- to encourage drinkers not to drive at all after drinking;
- to provide knowledge on the alcohol content of different drinks with regard to the legal limit;
- to provide knowledge on the impact of such aspects as coffee, body weight etc on the BAC level;
- to encourage drinkers to use alternative means of transport;
- to encourage intervention behaviour in potential drink driving situations;
- to simply change the social attitudes to drink driving, appreciate of the role of alcohol in accidents;
- to provide knowledge of penalties.

As a result of the range of goals a range of measure types were used ranging from campaign awareness, attitude, motivation and observed and self reported behaviour.


DRINK DRIVING CAMPAIGNS
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1.14
0.88
0.24
0.17
0.05
0.05
0.7
Campaign awareness
Awareness of issues
Knowledge
Attitudes
Motivation
Behaviour self-report
Behaviour measured

General Road Safety

Motorcycle										
Study	**Country**	**Duration (weeks)**	**Pre**	**Post**	**Pre%**	**Increase**	**D Value**	**Measure Type**	**Measure**	
RG1	Europe 76	9	4406	4856	8.6	2.7	.1278	7	Wearing bright clothing	Lalani & Holden
			4406	4856	3.2	21.2	.9154	7	With headlights on	
					.8	5.1	.4054	7	With both	
RG2	Australia 78	12	2335	1935	49.6	12.2	.3514	7	With headlights on	Huebner
					47.7	11.8	.3384	7	With light colour helmets	
					.7	5.1	.4127	7	With relfective matter	
Children										
RG3	Australia 83	-	78	321	57.7	17.4	.666	3	Aware of child "tunnel vision" problem	Fischer & Lewis
			78	144	5.1	83.1	4.4377	2	Heard of term "tunnel vision"	
			78	307	26.9	24.2	.8987	3	Know what term means	
RG4	US 76	58	1139	1017	10.0	66.0	2.5320	2	Advertising recall	Preusser & Blomberg
			8746	9079	25.7	4.3	.1358	7	Proportion of children displaying correct crossing behaviour	
RG10A	Europe 71	12	2500	2500	45.5	3.5	.0992	7	Children showing correct crossing behaviour	Morris
			1000	1000	10.5	27.5	.9576	3	Knowing of crossing rules	

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	Measure Type	Measure	
Adult - road user behaviour										
RG5	US 73	1	2065	6063	12.6	3.6	.1668	7	Signalling turns	Blomgren et al
RG7	NZ 73		600	600	81.6	2.0	.0746	7	Wearing seat belts	Toomath
			200	200	74.2	-9.1	-.2806	7	Not exceeding speed limit	
			340	390	65.2	.1	.0030	7	Stopping at stop signs	
RG8	NZ 73	4	340	340	78.2	8.2	.3052	7	Stopping at stop signs	Toomath
			200	200	17.8	-2.8	-.1068	7	Not exceeding 30mph limit	
			1500	1500	83.5	4.3	.1737	7	Pedestrians not crossing illegally	
RG9	Australia 78	6	50	50	-	-	0.000	7	Pedestrial fatalities in over 50's	Linklater & Lind
RG10B	Europe 71	4	15893	15681	87.5	-.2	-.0085	7	Proportion of cars overtaking correctly	Morris
RG11	Europe 88	1	1490	1486	94.0	-3.0	-.1613	4	Drivers who rated speed in poor conditions hazardous	Christie & Downing
			1498	1482	89.0	0.0	.000	4	Drivers who rated close following as hazardous	
RG12	Canada 85	2	252	238	11.0	25.0	.8712	2	Awareness of intersection enforcement campaign	Mercer

Bike Helmet Campaigns

Study	Country	Duration (weeks)	Pre	Post	Pre%	Increase	D Value	Measure Type	Measure	
RH1	Australia 88	3	798	798	16.0	10.0	.3496	7	Behaviour of 11-14 bike riders	Transport Tasmania
RH2	Australia 84	47	681	536	4.6	34.0	1.2912	7	Helmet use by primary children	Wood & Milne
			1774	741	1.6	12.4	.7369	7	Helmet use by secondary children	
			502	421	26.1	15.9	.4827	7	Helmet use by adult commuters	
RH3	Australia 87	69	905	1563	5.5	8.3	.4164	7	Helmet use in 5-15 year olds	Di Guiseppi et al
RH4	Australia 88	12	4919	3863	11.5	.8	.0352	7	Helmet use by secondary students metro and rural	Wise

Speeding Campaigns										
Study	**Country**	**Duration (weeks)**	**Pre**	**Post**	**Pre%**	**Increase**	**D Value**	**Measure Type**	**Measure**	
RS1A	Europe 88	3	38,685	49,871	52.0	3.0	.0858	7	Proportion of motorists below 90kmph	Riedel et al
RS1B	Europe 88	3	88,647	189,290	52.0	13.5	.4200	7	Proportion of motorists below 90kmph	
RS3	Europe 79	4	2000	4000	77.5	6.0	.2278	7	Proportion below 36mph	Simmonds
RS4	Australia 86	12	5454	5246	9.6	12.4	.4879	7	Proportion under speed limit	Webster & Schnerring
			374	375	67.6	7.1	.2220	4	Positive attitude to lower speed limit	
			374	375	48.5	11.0	.3136	4	Belief 50 kmh limit appropriate	
			374	375	39.0	13.5	.3863	4	Proportion in favour of 40kmh limit	
RS5	Australia 88	24	1408	9159	89.0	5.3	.4004	7	Proportion of vehicles under 80kmh	Phillips & Maisey
RS6A	Europe 87	-	1000	2000	56.0	4.0	.1216	7	Proportion under 80kmh limit	Rooijers
RS6B	Europe 87	-	.000	2066	50.5	-3.5	-.1653	7	Proportion under 80kmh limit	
RS6C	Europe 88	-	1000	2000	48.0	2.5	.075	7	Proportion under 80kmh limit	