Evaluation of Effectiveness of Public Education and Information Programmes Related to Alcohol, Drugs, and Traffic Safety

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In this paper, I shall address myself to the following questions. What methods are presently available for the evaluation of the effectiveness of mass media messages for the promotion of road safety? What have we learnt, while using these methods, about the design of effective mass communication programmes? How do these effects compare with alternative countermeasure activity such as legislative change and enforcement? How can we learn to make mass communications more effective and, finally, what countermeasures for future use might possibly be derived from our present understanding?

I realize that detailed answers to these questions, supposing they were available, would demand more time than patience would endure. Therefore, I will concentrate on those factual findings and interpretations that I believe to be of major interest.

MEASURES OF CAMPAIGN EFFECTIVENESS

The ultimate goal and criterion of any safety publicity campaign is the reduction in the number of severity of accidents mediated through the action of road users. Accidents, especially the more serious and therefore more interesting ones, are relatively rare events, subject to marked statistical fluctuations over time and from site to site. This consideration, in combination with variance in reporting likelihood and procedures, makes accident statistics rather awkward as a practical measure in many research projects. Also, changes in accident tolls may be due to other concomitant factors, such as weather, seasonal variations, economic fluctuations, road engineering and increased seat-belt use, that is factors other than the one under investigation. Hence, intermediate criteria of campaign effectiveness are often applied, and evaluation efforts may take different forms.

For instance, one might consider (a) a reduction in the presence of alcohol in drivers involved in fatal and other accidents (whether at fault or not), or (b) an overall reduction in average blood alcohol concentration (BAC) levels in the road-using public at risk, but not necessarily involved in accidents.

Alternatively, one might deem a campaign effective if it is followed by (a) a reduction in those higher BAC levels considered to be critical in contributory effect to accidents, or (b) an increase in the public's knowledge of the dangers associated with high BAC levels and a negative attitude towards their occurrence.

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Still other measures of effectiveness are an increase in the public's knowledge of laws dealing with drinking and driving, and the ability to recall elements of the publicity campaign (e.g. the slogans used or the media).

There can be no argument about the great difference in relevance between these criteria. A drop in the BAC levels of drivers involved in fatal accidents is a valid reflection of campaign effectiveness only if the total number of accidents occurring is also reduced. Another problem of this criterion is that a substantial reduction in the number of accidents is quite compatible with an increase in BAC levels among those killed.2

The remaining criteria have even more drastic shortcomings. Their use seems to be based upon the assumption that a change in knowledge will produce a change in attitude, which in turn will result in a change in actual behaviour. Some data, obtained in contexts other than road user behaviour, seem to corroborate this assumption, but other findings indicate that attitude change may follow behaviour change that was induced through different means (e.g. forced compliance or manipulation of reward conditions contingent upon the behaviour in question). It is to be regretted that the academic literature regarding cognitive, attitudinal and behaviour change (20) does not provide greater certainty in these matters. It may be concluded, however, that the use of non-behavioural indices of effect should be regarded with great caution, if not suspicion.

The problem is further complicated by the fact that the measurement of knowledge or attitudes necessitates a situation that brings its own weaknesses with it. Measurement is almost invariably verbal in nature and therefore suffers from the biases characteristic of an interview or questionnaire situation. The operation of response sets, and the desire to make a socially desirable impression upon the interviewer or experimenter are some examples of these difficulties. Verbal behaviour is instrumental, purposeful behaviour and therefore not necessarily expressive of the subject's behaviour tendencies under different conditions. Studies that encourage some confidence in the relationship between self-reported and actually observed road user behaviour (13) are rare and do not reduce the overriding need for observational data as dependent variable of campaign success.

A rather amazing example of the discrepancy between verbally assessed and actually observed behaviour was provided in an experiment on driver frustration (10). The driver of an experimental car was instructed to remain 'stopped' at a signalled intersection after the signal had changed to green. The effect of this frustrating event upon the driver of the car behind was investigated by measuring the time he took to sound his horn. Two different cars were used, an expensive, high status vehicle and a rusty, low status car. It was observed that the high status car produced significantly longer time lapses before honking occurred than the low status vehicle. A parallel study, in which the subjects were asked how they would behave in the two situations also produced significant results, but they were in the opposite direction.

Experience with road safety campaigns offers several examples of lack of concordance between questionnaire and road behaviour effects (35). Such discouraging results also seem to be common in the field of programmes against driving after drinking. The Canadian breathaliser legislation in combination with an accompanying

2If for instance, among all those who drive after drinking, the social drinkers are most affected by the countermeasure, thereby reducing their share of the fatal accidents, the proportional contribution of the very heavy drinkers must necessarily increase. An increase in the proportion of those with BAC readings over the legal limit in the total number of drivers killed may thus be observed, and this would not be incompatible with a reduction in the rate of fatal accidents.
publicity programme, has been followed by major cognitive and attitudinal changes; but no definite, measurable effect upon road accident rates occurred (5). A recent countermeasure programme conducted in Texas, made use of questionnaires and of BAC levels observed in roadside surveys as yardsticks of effectiveness. Major impact upon the level of knowledge in the general and the driving public was the result but the percentage of people driving at BAC levels ≥ .10% remained unaffected. It amounted to approximately 11% of all drivers before and after an intensive one year campaign (28). Yet no fewer than two-thirds of these high BAC drivers said they had heard of the alcohol and driving campaign. A recent study carried out in Austria (29), gives us little information about the relationship between attitudinal, cognitive and behavioural changes as the campaign failed to measurably influence any of the variables. The author inferred from his study, however, that the longer the road experience of the driver and the better opinion he has of his own driving ability, the more often he drinks before driving. The latter was true particularly for persons between 40 and 55 years and was rare among those younger than 25. In Vermont, an educational campaign resulted in both cognitive and BAC changes according to roadside surveys (34). However, in a preliminary report, no rigorous statistical evaluation was made of the effects claimed and sample sizes were not mentioned. A Canadian campaign, carried out in Edmonton with Calgary as a control city, showed major cognitive and attitudinal changes on the part of the driving public, but a significant impact upon BAC levels remains to be demonstrated (11). 3

If changes in attitude and knowledge are not systematically related to changes in the critical behaviour, i.e., the amount of drinking prior to driving, there seems to be even less justification for using the recall of the message or the media by a sample of respondents as a meaningful measure of campaign success as was done in some recent studies (14, 24).

**LEGISLATIVE CHANGE AND ENFORCEMENT**

It would seem fair to infer from the evidence presented so far that the effect of mass communication messages upon driving after drinking remains questionable. In view of this, one might ask what effects upon this behaviour may be expected from safety publicity? Mass communication has been demonstrated to be capable of bringing about changes in several elements of road user behaviour such as seat belt and head light use (35, 37). However, its persuasive impact may be insufficient to affect deep-rooted cultural habits among social drinkers, or sociopathic tendencies among problem drinkers and alcoholics. This reasoning would seem to favour a different approach with clear cut threatening consequences such as stiff penalties and intensive enforcement. However, what do we know about the actual effects of the law?

Let us first consider the few empirical studies regarding special deterrence, that is, the educational effect of a penalty upon an offender, manifested by a desirable behaviour change after the penalty has been delivered to that person.

3A calculated error seems to be present in Table XIV, p. 25 of the Edmonton study. The first chi-square value mentioned should read 4.2636 instead of 2.1628 (df = 1), indicating that a significant drop in BAC level also occurred in the control city. No evaluation is given of the significance of the difference in BAC reduction between experimental and control areas.
It is estimated that between 40 and 70 percent of those drivers whose licences have been suspended or revoked continue to drive. The longer the period of disqualification, the greater the likelihood that it will be disregarded\(^4\) (3, 4, 8, 21). In one study (4) it was found that almost 40 percent of all convicted drivers showed one or several cases of recidivism in a 12-year follow-up period.

Jurisdictions in West Germany which have mandatory jail sentences for drunken driving, when compared with other areas in that country where jail sentences are not mandatory, fail to show lower recidivism rates (3). As with the length of licence suspension, there is some evidence that the longer the jail sentence of the individual, the greater is the probability that he will commit the offence again. Of course, this does not necessarily imply a direct causal relationship\(^5\) but it would seem to show that the special deterrence exercised by the law has little effect. The size of the penalty has not been shown to influence recidivism rate favourably. Studies carried out in Sweden (21) seem to offer an explanation of why this might be the case. The hardships following licence suspension, in combination with other conditions (such as the long delay between the traffic incident and the announcement of licence suspension that sometimes occurs) produce strong feelings of hostility and resentment towards the legal system and the authorities. These hostile feelings not only overshadow the feelings of guilt and shame, but create a state of mind incompatible with effective re-education and rehabilitation. These reactions may be further strengthened by the individual’s awareness that undetected driving after drinking is so commonplace that he is put in the position of unsolicited martyrdom for his fellow motorists. Hence the feeling that society has committed a crime against his person.

Furthermore, it may well be that the potentially maximum effect of special deterrence upon a reduction in accidents is quite limited even if the functioning of the law in this respect were optimized. This is because only a relatively small percentage of all accidents occur to individuals who have prior accidents or violations. It has been calculated that more than 95 percent of all accidents in a two-year period would still happen if all individuals who had three or more violations in the preceding two years were removed from the roads. Similarly, less than five per cent of all accidents would not occur in a three-year period, if all individuals who had two or more accidents in the preceding period of three years no longer drove (6). Consequently, whatever may be achieved through the special deterrent actions of the law should be viewed in the proper perspective of the total accident problem.

Next, we may compare the effectiveness of road safety publicity regarding drinking and driving with the general deterrence exercised by the law, \(i.e.,\) its preventive influence. Investigations have been conducted in several countries in conjunction with the introduction of new, usually more severe, legislation.

Measurements of BAC levels of drivers stopped at roadblocks show an appreciable decrement, especially among the lower BAC levels. A reduction in the number of charges for driving while under the influence of alcohol may also be observed (17, 18) but in other cases charges may increase (12). From roadside surveys, it appears that moderate drinkers are more affected than heavy drinkers by such legislation (22). A similar pattern of results is found in drivers involved in fatal accidents (16, 25). A marked decrease in the total number of road fatalities was

\(4\) This does \textit{not} seem to be a spurious finding due to greater likelihood of detection as the period of suspension increases.

\(5\) It might be, for instance, that those who are likely to commit the offence have characteristics that also lead to long jail terms.
observed in one country (27), along with lower BAC levels in those who died, but in other countries such favourable results have not been found (5).

However, these changes, even if they do occur, do not seem to be characterised by permanency. After some time, the number of prosecutions return to "seasonal norms" (18) and fatal accident rates slowly return to previous levels (16). Legislation regarding drinking and driving may form no exception to the more or less general phenomenon of "regression towards the pre-existing trend" that would seem to characterize accident rates some time after the introduction of any measure affecting safety (36).

There are several reasons that may account for this. The introduction of a new law is usually widely announced by the mass media. This may increase the general expectancy of the driving public that police enforcement has been stepped up appreciably. After some time people may find out that this is not so. Another potential factor is the reaction of the police and the courts. When prosecution rates go up, juries become more hesitant to convict, judges more reticent to impose heavy penalties and police officers in turn become less inclined to charge (9), the combined effect of these factors being a return to the 'normal', original base rates.

Following a legislative change involving an increase in prosecution rates and when penalties are made more severe, the courts are faced with a considerable dilemma. Severe punishment is usually reserved for those crimes that are viewed as highly immoral by the citizens of the country who – however indirectly – determine the content of the law and the nature and magnitude of punishment. However, the perceived immortality of an act would seem to depend very largely upon the social deviancy of the behaviour involved. Rapid increases in the frequency of prosecutions may lead to a reduction in the perceived deviancy of the act and hence provide a lesser justification for severe punitive actions. This is one factor that might explain the reduced tendency to convict or severely punish when charges are laid and it may also explain the reservation of heavy penalties for a few cases.

Consequently, in order to justify the severe penalties, either enforcement rates or the number of convictions have to be kept down. Out of this another dilemma arises. From an accident prevention point of view, a legal BAC limit of .05% or .08% may be too high, but if penalties are severe, these levels are too low to be truly enforceable and punishable. It may be argued that the current custom of severely penalising a small minority of the actual offenders, while the majority are undetected or unconvicted, constitutes an expedient, but basically unjustifiable, compromise that is bound to fail as a deterrent measure.

It is a truism, of course, that laws are more the result of events in the field of political forces than the social outcome of scientific evidence. Laws may well satisfy their political purposes without having a major effect upon the problem that they were apparently designed to solve.

Passing a law that condemns a very considerable proportion of the driving population does not seem to be capable of producing long term effects. A law that, strictly speaking, would have to be applied to as many as between 2 and 10-15% of all drivers using the roads at a particular time of day cannot be applied, either physically or morally. The behaviour in question is not sufficiently deviant to warrant continued public support for severe punishment for its occurrence. Passing a law that specifies a particular BAC level (e.g. 0.08 or .10%) as unacceptable does not take account of the observation that the likelihood of an individual of having an accident would seem to be monotonically dependent upon the BAC level of the individual. The apparent sudden rise beyond .05 or .08% could well be the result of an incomplete analysis of
presently available data. Reanalysis of the now classic Grand Rapids data has indicated, for instance, that daily drinkers are almost as safe at a BAC of .09% as an abstainer or near-abstainer at a BAC .02%. For the individual it seems to be true, however, that the chances of having a road accident increase monotonically with the amount drunk, that is, there are no ‘critical’ thresholds such as .05 or .08%. This observation seems to be in agreement with laboratory findings that show that the degree of behavioural impairment in an individual at a given level of BAC depends very much upon his habitual drinking frequency. In light of this, it is not astonishing that habitually drinking drivers in an Austrian roadside survey (29) showed little belief in the statement that their driving capabilities were seriously impaired at BAC levels up to approximately .08%. Their own life experience would certainly not substantiate such a conclusion. Thus, it seems that we must face the following situation: if the critical legal BAC level is set relatively high, the calculated potential benefits for accident reduction will be correspondingly diminished. If, on the other hand, the critical BAC level were set relatively low, the law becomes unenforceable.

Even if this dilemma were satisfactorily resolved, other problems are likely to remain. A countermeasure succeeding in preventing alcoholics from drinking prior to their driving might not fully reduce their accidents to an average level because of the presumed proneness of alcoholics to have accidents even when sober (31, 33). Alternatively, a countermeasure that successfully reduces driving by alcoholics and problem drinkers after drinking but that does not affect their drinking, may have no beneficial effect upon the number of fatal accidents incurred by these individuals as pedestrians, or while they are driving during a hangover. Also their mortality due to accidents in other situations than traffic would not be favourably affected. It is difficult to estimate the precise quantitative effects associated with these factors, but they should nevertheless be considered.

If countermeasures are introduced in a manner that leads to an emphatic pin-pointing of alcohol as the main culprit in fatal and other serious accidents, large segments of the driving public (the ‘sober drivers’) might be led to believe that they have no major responsibility in the cause of accident avoidance. Blaming accidents on a single cause and the ensuing reaction of ‘scape-goating’ the intoxicated drivers as the most culpable in the road accident problem, might well result in reduced caution while driving on the part of large segments of the ‘sober and generally law-abiding’ citizens (23). Finally, if countermeasures effectively curtailed road accidents over a certain period of time, the resulting awareness of the driving public that ‘the roads are no longer as dangerous as they used to be,’ might lead to reduced caution in some drivers and consequently contribute some momentum to a regression to pre-existing trends of accident statistics (36).

Countermeasures have to be designed and executed in the light of what is presently known and whatever considerations emanate from the current state of information. As it is evident from this report that, in many respects, solid information is lacking on the direct and indirect or delayed effects of countermeasures implemented in the past, an experimental, explorative, and research-oriented approach is more

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6This and several other issues discussed in this paper are more elaborately documented in a report prepared by the present author: *Alcohol and Highway Safety, Part II, Alcohol and Traffic Accidents: A Review in Quest of Remedies*. Published by Transport Canada, Ottawa, 1974, and submitted to the NATO Committee on the Challenges of Modern Society.

7Alcoholics, matched with members of the general population, were found to meet with death 4.5 times more often in traffic, 16 times more often as a result of a fall, 30 times more often due to accidental poisoning, and 3 times more often due to other types of accidents.
warranted at the moment that the formulation of definitive, doctrinaire and inflexible verdicts in the domains of law, public education and in other areas in which counter-measures may be conceived.

RESEARCH INTO MASS COMMUNICATIONS EFFECTIVENESS

It would seem that the presently available 'academic' or 'experimental' literature provides us with little conclusive information on the use of mass communications as a means to reduce the rate of alcohol-involved accidents and specifically, how we can learn to make these communication procedures more effective. The problematic relationship between attitude, cognition and behaviour has already been mentioned. Moreover, it may well be that 'academic' psychology will continue to be of limited use in this respect, because of its insistence upon traditional laboratory experimentation as a means of data gathering.

The validity of laboratory experimentation is limited by the following factors:

First, of all possible independent variables that influence behaviour in any practical situation, a laboratory experiment selects only a few for test. As a result, hidden or unsuspected interactions in real-life may easily nullify, or even reverse, conclusions arrived at in the laboratory. Second, variables always change when they are brought into the laboratory. Third, the effect of controlling extraneous or irrelevant variables in the laboratory is to increase the precision of an experiment but at the risk of discovering effects so small that they are of no practical importance. Fourth, the dependent variables (or criteria) used in laboratory experiments are variables of convenience. Rarely are they selected for their relevance to some practical situation. (7)

To this quotation, the following considerations may be added: Fifth, laboratory experiments almost invariably make use of volunteers, who are known to differ from the general population in demographic as well as personality characteristics (26). Sixth, most measurement techniques are reactive, i.e., they bring about a change in the behaviour under investigation (15) and interfere with a proper assessment of the effect of independent variables. Seventh, laboratory studies make a rigorous distinction between independent and dependent variables that may find no realistic counterpart in real life. Exposure to a communication, for instance, is a behaviour normally under the control of the subject, not the experimenter. Laboratory studies on the effect of alcohol on behaviour involve amounts of drinking determined by the experimenter, not by the subject. To the laboratory experimenter, this would seem entirely appropriate, but in real life it may well be that the subject's decision to drink to a state of inebriation derives from the same causes as his subsequent decision to drive, and to drive in a particular manner. Alcohol does not 'cause' accidents in the same sense as heat causes ice to melt. Some persons may be poor drivers for the same reasons that they drink too much. Thus both drinking and dangerous driving may be viewed as dependent variables and to construe the former as an independent variable takes no account of the natural history of behaviour. The logic of laboratory experimental design in many cases has no ecological validity.

This rather heavy elaboration may perhaps be summed up in a metaphoric story as told by a grand old man among Belgian psychologists, Professor Nuttin. A psychology professor who is searching all over the floor of his laboratory is surprised by a student who comes in late at night. The student asks him what he is looking for and
the professor tells him he has lost his gloves in the park. But, so the student says, why don’t you look in the park if you lost your gloves there, to which the professor answers that it is dark in the park and in the lab at least there is light.

INCREASING COUNTERMEASURE EFFECTIVENESS

I am inclined to infer from this type of reasoning that a truly scientific knowledge of how to influence behaviour through mass communications can best be derived from operational research involving field experimentation and field studies. In other words, by conducting and evaluating mass communication campaigns we will eventually learn how to do it effectively. Past research already has identified a number of principles that would seem to differentiate the successful from the unsuccessful publicity programmes. Some of these principles are instructiveness, immediacy and personal relevance of the message, the conspicuousness of the target behaviour and the deliberate enhancement of social imitation among the target audience. These principles have been described elsewhere in more detail (35, 36, 37).

For this knowledge to be further developed a number of conditions must be fulfilled. First, no major campaign should go unaccompanied by serious and thorough research into its effects. Second, the evaluative research should be conducted in agreement with the requirements of good experimental design including adequate control data and nonreactive measurement. Lack of adherence to rigorous research methods has weakened the conclusiveness of the results of many alcohol campaigns carried out so far. To work in the field rather than in the laboratory is no excuse for sloppiness.

What has been said about the need for field experimentation in the domain of mass communication also holds for research into the effects of alcohol upon actual driver behaviour. Laboratory research can indeed identify potential sources of variances but this is also the best it can do. It cannot measure the extent to which these factors actually contribute to accident causation. The few field experiments on the effect of high BAC levels on driving in real traffic have produced results that only marginally corroborate what has emanated from laboratory investigations8 (30). We do know that a functional relationship between alcohol and accident likelihood exists but why this is so has so far remained largely unknown, because few realistic studies have focussed on the question of how greater accident likelihood is mediated through the consumption of alcohol. No rational development of countermeasures can occur without this knowledge.

Another requirement for progress, so it would seem, is that we refrain from the rather fruitless battle about the alleged superiority of either legislation, mass education or physical road and vehicle modifications for the promotion of safety. Recent experience following Australia’s legislation which made the wearing of seat belts mandatory is a case in point. This legislation was passed, among other things so it seems, because of an (erroneous) impression that mass education would not produce any results. Following legislation, seat belt wearing did indeed increase, but the beneficial effect upon accident survival rates, according to my calculations, amounted to about one half of what could have been expected on the basis of earlier established relationships.

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8The author had subjects drink to BAC levels of approximately .13% who drove in real traffic in a West Germany city in dual control cars. Driver errors made under sober and intoxicated conditions were observed and compared. Perceptual and judgemental driving skills were not significantly affected, but significant differences in tracking performance were established.
between seat belt wearing and crash survival (32). This may be due to the fact that only about 11 per cent of drivers in the State of Victoria who use their seatbelts appear to buckle them adequately. As a consequence, the authorities have decided that a mass media campaign is necessary to bring about proper wearing habits! An integrated legislative-educational-ergonomic effort might well have been preferable.

I can only speculate on what form such a comprehensive approach in the area of drinking and driving might take. The following points could perhaps be considered. First, drinking is usually not a solitary but a group activity. By implication, this behaviour is not only a function of the traits of the individual but of the dynamics of social interaction. Yet the law makes the drinker responsible for his behaviour as an individual, as if he were an autonomous entity. It might be argued that the law should be designed so as to address itself more to the patterns of human interaction in which drinking takes place. One possibility in this direction might be a greater use of concepts such as accessory to the act and co-responsibility of others for the act of driving after drinking.

Second, the law will fail to have special deterrent effects unless the punishable BAC level is set at a high level that rarely occurs in the driving population. Punishment should be fast and in accordance with public opinions of justice (2). However, the potential contribution to accident reduction to be made through special deterrence remains small even when maximised.

Third, the general deterrent effect of the law seems to depend largely upon the level of perceived enforcement risk. Should we therefore say the more enforcement the better? I think not, because of the undesirable side-effects that may follow. If many drivers are stopped by police, a negative attitude towards the police and the authorities in general might well ensue. Some studies seem to indicate that the many unpleasant contacts between public and police, that have been a consequence of the general use of the automobile, may have contributed to hostility towards the police and decrease in respect for the law of the land (9). In other words, what may be gained in road safety may be lost elsewhere.

Fourth, mass communication theory suggests among other things that there should be more immediacy between the message and relevant situation. Accordingly, bottles and other containers of alcoholic beverages may be provided with a warning saying: the chances of having an accident increase with the amount drunk. Similarly, warning messages may be placed in conspicuous places in bars, restaurants and the like.

Fifth, in agreement with the principle of instructiveness in effective mass communication, any law regarding drinking and driving should be publicized in a concrete, unambiguous manner that informs drivers of what amounts of drinking result in what levels of BAC and thus should be avoided.

Sixth, road collisions are rare events in the life of any particular individual and they therefore give him little opportunity to learn to avoid them. A person might, however, learn from road collisions that had happened to others if the relevant information of contributing factors were made available. Ideally, therefore, accident reports in newspapers, radio and television — reports that enjoy a high degree of public attention — should be presented in such a way as to maximize the opportunity for learning. All commercial advertising and related publicity should be made so that they do not interfere with the promotion of safety-oriented behaviours.

Seventh, the general public and the law makers should be exposed to whatever is scientifically known about accident causation in order to reduce the likelihood of the introduction of laws and other countermeasures that may not be effective.
Good laws and good mass communication are precious instruments in a society that attempts to optimize its functioning. Injudicious use of these regulatory and behaviour shaping instruments can only help to erode their potential beneficial effect in the future.

REFERENCES

11. The Edmonton Study; The Impact of a Drinking Driving Campaign. Published by Transport Canada, Road Safety, Ottawa, 1973.


