BACKGROUND AND PURPOSE

It would seem desirable that the designers of any road safety effort take account of the existing attitude and beliefs of the target audience. This is not to say that safety countermeasures should be chosen primarily by the public’s opinion of their effectiveness in reducing the number or severity of accidents. Neither should they be selected primarily on the grounds that they enjoy public favour. It is obvious that strategies for safety promotion should be founded on scientifically acceptable theories about the causes of accidents, their prevention, and the reduction of accident severity. It would be most surprising if there were perfect agreement between what the public feels should be done and what scientific evidence indicates should be done. If the responsible authorities chose safety measures exclusively by their public acceptability, they might please their audience but not reduce the problem at which the measures were directed. Similarly, failure to introduce scientifically promising countermeasures because they are unpopular with the public might have some political advantages, but would not discharge the authorities of their responsibility for public health and economic well-being.

For instance, there is no convincing evidence that either an increase in the penalties for driving under the influence of alcohol, or the installation of traffic lights at intersections reduces the number or severity of accidents. In fact, several studies indicate these measures have no beneficial effect on safety at all. Nevertheless, they have been adopted often, apparently due to pressure from the general public or particular advocacy groups.

This does not mean that countermeasures should be designed without regard for public opinion. There are several known instances of safety measures that drivers have opposed and have consequently tried to circumvent with persistence and ingenuity, for example, in the United States, the linking of engine ignition to the buckling of seatbelts. The law requiring car manufacturers to install this mechanism was subsequently revoked.

Public opinion limited the effectiveness of this safety regulation, which under more favourable conditions might have been a major help in decreasing accident severity, judging by reliable scientific evidence.

These considerations suggest that we should have at hand information that allows us to predict public reaction to governmental and similar safety policies with reasonable accuracy. This information should influence the design and the manner of promulgation of the safety measure. We should take public reaction into account whether the safety measure is a new law, a change in vehicle engineering, road geometry, signs or signals, or public education through the mass media.
Drivers’ Concern and Opinions

In those instances where legislators have tried to gauge public readiness to accept safety regulations, they have often relied on newspaper editorials, letters to the editor, or similar materials. How far these sources represent the views of the general population is unknown, but their value would seem to be most questionable. In the absence of better indicators, decision-makers often navigate by an unreliable compass that deviates from true North to an unknown extent.

In some instances designers of mass media safety campaigns send messages to their audience without knowing the degree of public resistance to the behaviour advocated. Several authors have stressed the importance of knowing the nature and strength of existing objections in particular target groups as well as the public as a whole. Sheppard (quoted in Wilde, L’Hoste, Sheppard and Wind27) coined the term ‘barrier research’ for this area of investigation. Sheppard in the United Kingdom and Prigogine19 in Belgium have conducted interview studies to identify public objections to a few specific countermeasures. A number of researchers have investigated the public beliefs about the effectiveness of seatbelts. Most of the studies published previous to 1973 have been reviewed by Fhaner and Hane.6-7 More recently, research has been carried out by Bragg3, Knapper, Cropley, and Moore14 and Hannah10 in Canada, and by Pfaaffrot18 and Berger, Bliersbach and Deller2 in Germany.

However, there seems to have been no study of the public’s estimate of the effectiveness of a comprehensive variety of potential safety measures, including such diverse items as speed limits, more severe penalties for violations, increased enforcement, raising the legal drinking age, and more stringent driver examinations. Are the drivers who believe strongly that mandatory seatbelt use would be effective in saving lives the same people as those who attribute great effectiveness to lower legally critical BAC levels or safety messages in the mass media? No information is available regarding the existence of clusters or patterns of beliefs concerning effectiveness, nor do we know the relation of believed effectiveness to the degree of favourability toward the safety measure in question. We do not know what kind of people have what kind of beliefs concerning effectiveness or favourability attitudes. Is there a positive association between being in support of doubling the penalties for driving while impaired and favouring driver re-examination every five years, or is this association non-existent or even negative?

Another issue that we wished to investigate dealt with differences between drivers in the extent to which road safety is felt to be an important problem. Do different drivers experience different levels of anxiety about their own personal danger in automobile driving? If road users differ markedly in their concern for road safety, is this concern related to demographic variables, such as age, sex, etc., as well as the estimated effectiveness and desirability of specific accident countermeasures?

In summary, the purpose of this study is to investigate the structure and extent of drivers’ beliefs in the effectiveness of potential public policies for safety, to investigate the structure and extent of their views on the desirability of these policies, to investigate the nature and extent of the concern that drivers may have for their own safety on the road and to examine the relationship of the above features with one another as well as with demographic variables.

THE CONCEPT OF CONCERN FOR ROAD SAFETY

The likelihood that an individual will adopt a recommended safety behaviour would seem to depend on the need felt by the individual to increase his safety and on the degree to which he views the recommended behaviour as effective in satisfying this need. When the recommended behaviour is voluntary in nature and not a legislative imperative, we might posit that, other things being equal, each person’s probability \( P_B \) of adopting the behaviour is proportional to the product (sum or some more complex function) of his degree of concern.
(C) for road safety and his belief in the effectiveness of the behaviour, BE_B. If we assume that the relationship takes the form of a simple product, the following equation may be written:

$$P_B^{\times C} \times BE_B$$

Some recommended behaviours are not voluntary, but they are public policy measures aimed at the driver population as a whole, and are associated with laws and prosecution in case of non-compliance. When an individual citizen is asked whether he favours the introduction of such a legal measure, we may assume that other things being equal his degree of favourability (FAV_B) depends on his concern for road safety and on the extent of effectiveness that he attributes to this measure:

$$FAV_B^{\times C} \times BE_B$$

But other things are rarely equal in reality. Individuals differ in the extent to which they view the proposed countermeasure as interfering with other needs — comfort, convenience, civic rights, justice, economy, and so forth. They also differ in the extent to which these needs are important to them. This is why the relation between FAV_B and C \times BE_B would not be perfect. In some cases the amount of favourability would be much lower than we might expect on the basis of concern and believed effectiveness alone. In other cases it might be much higher, particularly if the countermeasure in question offers other benefits, in addition to safety.

The actual measurement of favourability and believed effectiveness would not seem to pose problems as existing techniques for attitude measurement may be applied. However, a new instrument is required to assess the degree of concern for road safety. For this purpose it is necessary to elaborate our view of this concept and to develop a tentative theory on how both high and low concern in individuals reveals itself verbally.

The degree of concern can be roughly described as the degree to which the individual feels that road safety should be improved. Someone who perceives traffic accidents as frequent and severe in the consequences, who habitually takes actions to reduce the likelihood and/or severity of accidents, and who generally experiences a high level of anxiety, on the road, is manifesting a high level of concern.

Obviously, any driver will experience concern for his safety, given that the conditions or events are provocative enough. Bad weather, sudden vehicle failure, a poor passing manoeuvre by a driver in the opposing stream of traffic, and similar dangers will elicit transient states of high concern for safety in almost everyone. In this study, however, we are interested in concern for road safety not as a transitory state, but as a trait that characterises the individual as someone who is habitually more concerned than others, and whose higher concern is maintained across a large variety of traffic environments and situations.

In this study we attempt to use the questionnaire method to identify the trait of concern. This method allows us to question the respondent about his behaviour, feelings and beliefs regarding a large variety of events and ideas. Corroborating the concept then involves showing that the questionnaire responses show definite patterns that are consistent with our interpretation of the postulated trait.

A major advantage of the questionnaire method is that item content may be varied easily. A drawback is that the method relies exclusively on verbal data, and cannot assure us that the respondent is reporting his beliefs and behaviours accurately. Several studies of road user behaviours have demonstrated that the relationship between what people say and what they actually do is sometimes weak and sometimes absent. In the area of personality traits, however, it has been found that self-report questionnaires are in general no less valid and usually more reliable than other methods of assessment.
CONSTRUCTION OF THE QUESTIONNAIRES

In the course of this study three different questionnaires were designed.

The purpose of Questionnaire I (see Table I) was to prepare a scale for the measurement of individual differences in concern for road safety so that different individuals could be assigned a score depending upon their degree of concern.

TABLE I  Questionnaire I. Items selected for the measurement of the individual’s level of concern for road safety.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Before leaving on a trip in winter, do you try to find out what the weather and road conditions are like? (always, most of the time, sometimes, never).</td>
</tr>
<tr>
<td>7.</td>
<td>Suppose you are approaching a railroad crossing. The lights are not flashing. Do you look left and right before going across? (always, most of the time, sometimes, never).</td>
</tr>
<tr>
<td>10.</td>
<td>What kind of driver irritates you more? (someone who speeds, someone who drives very slowly).</td>
</tr>
<tr>
<td>12.</td>
<td>Do you see other drivers in dangerous situations more often than you find yourself in such situations? (much more often, somewhat more often, about the same, less often).</td>
</tr>
<tr>
<td>13.</td>
<td>Suppose there were no speed limit on Highway 401. How fast would you choose to drive when weather conditions are perfect and there is little traffic on the road? (60 mph, 70, 80, 90 or more).</td>
</tr>
<tr>
<td>15.</td>
<td>Before going on a highway trip, do you check your tyres or headlights? (always, most of the time, sometimes, never).</td>
</tr>
<tr>
<td>16.</td>
<td>How would you rate yourself as a driver? Would you say that you are more on the cautious or the daring side? (very cautious, more cautious than most people, about as cautious or daring as most people, more daring than most people).</td>
</tr>
<tr>
<td>25.</td>
<td>Suppose you are approaching a railroad crossing. The lights are not flashing. What do you usually do in this situation? (increase speed, maintain speed, slow down a little, slow down quite a bit).</td>
</tr>
<tr>
<td>30.</td>
<td>Does the car you usually drive have seatbelts? (yes, no).</td>
</tr>
<tr>
<td>42.</td>
<td>Suppose you were to buy a new car. What feature would be more important or appealing to you? (good headrests or good sized trunk).</td>
</tr>
<tr>
<td>43.</td>
<td>Compared to the average drivers, how likely do you think you are to be involved in a personal injury accident? (much more likely than the average driver, a little more likely, a little less likely, much less likely).</td>
</tr>
<tr>
<td>46.</td>
<td>When driving your car in town, what part of the time do you spend thinking about safety and the possibility of getting involved in an accident? (most of the time, more than half of the time, less than half of the time, much less than half of the time).</td>
</tr>
<tr>
<td>48.</td>
<td>Do you have a first aid kit in the car you usually drive? (yes, no).</td>
</tr>
<tr>
<td>52.</td>
<td>When driving your car on a highway, what part of the time do you spend thinking about safety and the possibility of getting involved in an accident? (most of the time, more than half the time, less than half of the time, much less than half the time).</td>
</tr>
<tr>
<td>53.</td>
<td>What are your own personal chances of losing your life in a traffic accident within a year compared to those of the average driver? (much greater, a little greater, a little less, much less).</td>
</tr>
<tr>
<td>55.</td>
<td>How many drinks do you think the average person can take and still drive reasonably safely within an hour afterward? (none, 1, 2, 3, 4 or more).</td>
</tr>
<tr>
<td>56.</td>
<td>When driving in the city do you wear seat belts? (always, most of the time, sometimes, never).</td>
</tr>
</tbody>
</table>

Questionnaire II (see Table II) contained a variety of potential public policy measures for the promotion of road safety, offered to the respondent with the request to indicate the extent to which he felt each of these measures, if implemented, would save lives (believed effectiveness). A second series of questions in this questionnaire aimed at determining the individual’s degree of favourability toward implementation of each of these accident countermeasures. Thus, each respondent was asked to rate his degree of believed effectiveness and his favourability with regard to forty different safety measures. The answers to Questionnaire
II were considered to be of interest in their own right, and they were also expected to guide the selection of a smaller number of questions for Questionnaire III.

This smaller group of items was to be included in Questionnaire III which would also contain the items for the scaling of an individual's concern for road safety. Thus, Questionnaire III included questions of all three categories; concern, believed effectiveness, and

TABLE II

Table II. Each countermeasure had to be rated according to believed effectiveness in saving lives (would save very many lives, many lives, a few lives, no lives at all) and according to favourability (strongly in favour, mildly in favour, undecided, mildly opposed, strongly opposed).

1. In cities and towns, reduce the speed limit to 25 mph.
2. On all two-lane highways, reduce the speed limit to 50 mph.
3. On four-lane highways, reduce the speed limit to 60 mph.
4. Reduce all bus ticket prices for trips between cities to one-half their present cost.
5. Reduce all train ticket prices to one-half their present cost.
6. Provide more frequent train service between cities.
7. Pass a law so that drivers have to wear their seat belt on the highways but not when driving in town.
8. Pass a law so that drivers have to wear their seat belt both on the highways and in town.
9. Provide more public transportation service (bus, streetcar, subway) in towns and cities.
10. Double the price of all beverages containing alcohol.
11. Have frequent safety messages on radio, television, and in newspapers.
12. Require that all new cars be equipped with wipers on the rear window.
13. Show pictures of wrecked cars and accident victims regularly on television.
14. Require that all drivers take lessons to learn how to control a car in a skid.
15. Prohibit left turns at more street intersections in towns and cities.
16. Place crosses or similar markers at road locations where fatal accidents have happened.
17. Increase government money supporting scientific research into the causes and prevention of road accidents.
18. Use psychological tests to prevent those individuals from driving who are accident-prone, who have undesirable driving attitudes, or who are otherwise psychologically unfit to drive.
19. Require that all drivers be examined on eyesight and physical health every five years.
20. Raise legal driving age from 16 to 18.
21. Raise legal driving age from 16 to 21.
22. Make it impossible for a car to start if the seat belts are not properly around the driver and the passengers.
23. Raise the legal drinking age from 18 to 21.
24. As the law stands now, when someone has accumulated 15 demerit points, the driver's licence is suspended for 30 days. Increase the suspension period to 60 days.
25. Have all drivers take an on-the-road driving test every 5 years.
26. Require that all motor vehicles be tested once every year for mechanical fitness.
27. Demand that anyone who has less than one year's driving experience be clearly visible as such to other drivers (for instance a large B for Beginner showing on the vehicle).
28. Establish a system of incentives and rewards for accident free and violation free driving (for instance free licence plate renewal for accident free and violation free driving in the previous year).
29. Do not allow any trucks on the roads on Sundays.
30. Double the penalties for traffic violations.
31. Reduce the blood alcohol level that is sufficient to convict someone of impaired driving to one-half its present amount.
32. Double the present penalties for drivers impaired by alcohol.
33. Equip new cars with improved headlights for increased visibility at night.
34. Double the number of patrolling policemen on the roads.
35. Prohibit all people 70 years of age or over from driving a motor vehicle.
36. Increase the price of (regular) gas to $1.00 per gallon.
37. Make the road test more difficult so that twice as many people will fail the driving examination the first time.
38. Equip all new cars with running lights that turn on whenever the engine is running.
39. Install traffic lights at twice as many street crossings as we have them now.
40. Convert more two-lane highways into four-lane highways.
Drivers' Concern and Opinions

In this manner an opportunity was afforded to investigate the interrelations among these three notions and to test the hypothesis that favourability toward a safety measure increases with the individual's concern for automobile safety and the extent of effectiveness in saving lives which he attributes to the measure in question.

Questionnaires I and II were administered first. Because of their lengths they were given to different samples of drivers. Following completion of the minimum necessary analysis, items were selected for Questionnaire III, and this Questionnaire was administered about two weeks later.

Most of the items in Questionnaire I were specially written for the purpose of this study. Some items, however, were adopted after some minor modifications from investigations by Bragg, Hannah, and by Knapper, Croppley and Moore.

A number of questions was inserted at the end of each questionnaire to obtain several demographic characteristics of the respondents: (a) an estimate of annual mileage driven, (b) make and manufacturing year of the car usually driven, (c) the age at which the respondent obtained his/her driver's licence, (d) his/her present age, (e) sex, (f) educational level, and (g) place of residence.

PROCEDURE AND RESPONDENTS

The questionnaires were administered to individuals who visited offices for extension of motor vehicle permits in Ottawa, Ontario, and Kingston, Ontario.

It was reasoned that those individuals who not only had a driver's licence but actually use a motor vehicle were to constitute the sample of respondents. Thus, they might be expected to be more interested in driving and in issues related to traffic than a sample from the general population or from the population of individuals who possess a driver's licence. Also, it was thought that the consideration or introduction of accident countermeasures would be of relatively major concern to the chosen category of individuals. As a consequence, they would be likely to have opinions about road accident prevention and the questionnaires would probably make sense to them.

A further advantage of the sampling procedure was the easy accessibility of the respondents. They present themselves at central locations provided by the licence extension offices and often have to wait several minutes in line, which could be expected to result in lower rates of refusal to co-operate than might otherwise be the case.

On 6, 7 and 10 February 1975, Questionnaire I was administered to 120 individuals in Kingston and 218 in Ottawa (total N = 338). Questionnaire II was administered on the same days to 120 additional Kingston and 217 additional Ottawa drivers (total N = 337). Finally, Questionnaire III was administered in Ottawa only, on 21, 24 and 25 February 1975 to 613 respondents.

Refusal rates were indeed found to be low. They varied between 10 and 20 per cent of those invited to participate and were observed to depend largely upon the length of the waiting line which constituted the individual's idle time. When the lines were short, the tendency to refuse was comparatively strong. Self-selection of subjects on the basis of their interest or lack of it in the content of the questionnaires could, therefore, be viewed as at a minimum. The percentage of male respondents, which varied between 75 per cent and 76 per cent of the samples drawn, corresponded remarkably well with the percentage of vehicles moving on the roads that are driven by men, as evidenced by traffic observation studies.
ITEM ANALYSIS OF QUESTIONNAIRE I

The product-moment intercorrelations of the first 56 items in Questionnaire I were calculated. A principal factor analysis of the $\frac{1}{2}n(n-1) = 1540$ intercorrelations was conducted by means of the SPSS computer program. Item communalities were calculated in terms of the first ten common factors.

The first unrotated factor accounted for 8.6 per cent of all variance and for 21 per cent of the common variance in the first ten factors.

For exploratory purposes, a Varimax rotation of the first ten factors was also conducted. This failed to produce a configuration that resulted in a higher level of interpretability than the unrotated structure. As a consequence, it was decided to identify the first unrotated factor as the most meaningful empirical specification of the extent to which the items reflect the concept of concern for road safety.

According to the item loadings, individuals with a high level of concern for road safety view the roads as more dangerous, they experience a higher level of anxiety when driving, they report taking more action to avoid accidents and to reduce their severity, and they perceive their chances of being hurt or killed as relatively low.

At the same time, this finding indicates that drivers who are comparatively unconcerned about safety view their chances of being injured or killed as relatively high when asked to compare themselves to the average driver.

On the basis of the factor-analytic findings seventeen questions were selected for insertion in a scale for safety concern (see Table I). Next, a scoring key had to be developed. For this purpose the 613 drivers who had answered Questionnaire III were used, as they constituted the largest sample available. We wished to assign drivers a single overall score reflecting their answers to the seventeen safety questions. This was done by the principal components method of scale construction, which was first applied to our type of data by Guttman. Various developments are described by Torgerson. The basic computational algorithm we used was due to Mosteller. Certain improvements in the algorithm suggested by Horst were incorporated.

The frequency distribution of the resulting 613 concern scores is approximately normal with a mean close to zero and a standard deviation of about 1.0.

BELIEVED EFFECTIVENESS AND FAVOURABILITY RATINGS

Part of the results of the ratings of the forty countermeasures is presented on Table III. Two statistics were used to investigate the relationship between believed effectiveness and favourability toward implementation. The first is Kendall’s tau, and it can be seen that the countermeasures differ appreciably in the extent to which favourability may be predicted from knowing the believed effectiveness ratings.

The second statistic, beta, was especially developed for the purpose of this investigation and attempts to quantify the degree in which favourability is relatively high or low as compared to believed effectiveness of the same item. The calculation of beta, explained elsewhere in detail, is theoretically independent of correlation and measures the displacement between the matrix of effectiveness/favourability response pairs of a particular item and the aggregate matrix pairs of responses to all forty items. The meaning of the magnitude of beta can be grasped easily. Suppose for a given countermeasure 60 per cent of all respondents give higher favourability ratings than one would expect on the basis of their effectiveness rating, this expectation being based upon the aggregate matrix of all response pairs. The remaining 40 per cent would give lower favourability ratings than could be expected from the effectiveness ratings given by these people. The comparatively more favourable would thus outnumber the comparatively less favourable people by $60 - 40 = 20$ per cent. Beta in this case would be $+ .20$. 
TABLE III Responses to selected items in Questionnaire II (N = 338)*

<table>
<thead>
<tr>
<th>Concern</th>
<th>EFF</th>
<th>S.D.</th>
<th>FAV.</th>
<th>S.D.</th>
<th>tau</th>
<th>beta</th>
<th>eff</th>
<th>fav</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 max 60 mph</td>
<td>41</td>
<td>1.01</td>
<td>.63</td>
<td>.61</td>
<td>-.17</td>
<td>.20</td>
<td>.31</td>
<td></td>
</tr>
<tr>
<td>6 frequent trains</td>
<td>33</td>
<td>.99</td>
<td>.79</td>
<td>.39</td>
<td>.20</td>
<td>.14</td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td>8 seat belts anywhere</td>
<td>78</td>
<td>1.04</td>
<td>1.59</td>
<td>.60</td>
<td>-.23</td>
<td>.31</td>
<td>.44</td>
<td></td>
</tr>
<tr>
<td>9 public transport town</td>
<td>35</td>
<td>.96</td>
<td>1.04</td>
<td>.39</td>
<td>.22</td>
<td>.14</td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td>10 double prices alcohol</td>
<td>40</td>
<td>1.12</td>
<td>1.60</td>
<td>.51</td>
<td>-.32</td>
<td>.14</td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td>11 mass safety messages</td>
<td>22</td>
<td>.77</td>
<td>.78</td>
<td>.56</td>
<td>+ .11</td>
<td>.18</td>
<td>.28</td>
<td></td>
</tr>
<tr>
<td>12 psychological tests</td>
<td>50</td>
<td>.93</td>
<td>1.24</td>
<td>.63</td>
<td>-.07</td>
<td>.15</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td>19 examine eyesight</td>
<td>52</td>
<td>.86</td>
<td>1.56</td>
<td>.57</td>
<td>+ .04</td>
<td>.14</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td>23 raise drinking age to 21</td>
<td>39</td>
<td>.90</td>
<td>.54</td>
<td>.67</td>
<td>-.13</td>
<td>.07</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td>24 increase suspension period</td>
<td>33</td>
<td>.81</td>
<td>1.35</td>
<td>.50</td>
<td>+ .07</td>
<td>.14</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td>28 incentives and rewards</td>
<td>28</td>
<td>.88</td>
<td>1.10</td>
<td>.42</td>
<td>+ .26</td>
<td>.15</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>31 reduces critical BAC</td>
<td>33</td>
<td>.77</td>
<td>1.49</td>
<td>.56</td>
<td>-.14</td>
<td>.14</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td>32 double penalties alcohol</td>
<td>58</td>
<td>.99</td>
<td>.77</td>
<td>.64</td>
<td>-.05</td>
<td>.09</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>34 double number patrolmen</td>
<td>19</td>
<td>.73</td>
<td>1.66</td>
<td>.52</td>
<td>-.02</td>
<td>.11</td>
<td>.12</td>
<td></td>
</tr>
<tr>
<td>38 equip running lights</td>
<td>7</td>
<td>.74</td>
<td>1.28</td>
<td>.53</td>
<td>+ .12</td>
<td>.15</td>
<td>.11</td>
<td></td>
</tr>
</tbody>
</table>

* EFF.; believed effectiveness rating; percentage of respondents indicating that safety measure 'would save very many lives' or 'many lives'.
FAV.; favourability rating; percentage of respondents strongly or mildly in favour of countermeasure in question.
S.D.; standard deviation calculated across all response options.
tau; correlation between effectiveness and favourability ratings.
beta; index of perceived (non-safety) side benefits or costs.
concern; product-moment correlation between concern and believed effectiveness and favourability (N = 613), all values r ≥ .08 are significant (p < .05).

It may be seen that all alcohol related items in Table III carry negative beta's indicating that these countermeasures enjoy less favourability than one would expect on the basis of their believed effectiveness. Items 6 and 9, on the other hand, are characterised by positive perceived advantages over and above their safety benefits.

DEMOGRAPHIC VARIABLES AND OPINIONS OF THE ALCOHOL RELATED COUNTERMEASURES

Each of the demographic variables was investigated on its correlation with the believed effectiveness and favourability ratings, as well as with the measure of concern for traffic safety. Significantly (p < .05) more opposition to doubling the price of alcoholic beverages (item 10) was found in individuals who drive large annual mileages (r = .22), who obtained their driver's licences at a relatively early age (r = .20), who are younger (r = .10), male (r = .19), and of a higher educational level (r = .10). Regarding believed effectiveness ratings, these correlations were (in the same order) .13, .10, .01, .16 and .17, while all correlations .10 or higher were significant at the .05 level. Correlations with favourability and effectiveness rating consistently carried the same sign.

Relatively lesser support for increasing the legal drinking age (item 23) was found in respondents who drive many miles per annum (r = .12), who drive newer cars (r = .12), who obtained their licence to drive at an early age (r = .17), and who are young (r = .19). Correlations between believed effectiveness of these items and demographic variables carried the same sign and were (in the same order): .02, .06, .15 and .21.

The idea of reducing the legally critical BAC level (item 31) was less well received by drivers who received their licence at a relatively early age (r = .17) who also felt that this measure was less effective (r = .20), while there was no significant association with the other
demographic variables. Doubling the penalties for driving while under the influence of alcohol (item 32) found more opposition among individuals with large annual mileages ($r = .17$), those who were licenced to drive at a relatively early age ($r = .17$), and who are male ($r = .14$), while age and educational level showed no significant association. Correlations with believed effectiveness were respectively $.11$, $.13$ and $.12$.

Drivers characterised by a higher level of concern for road safety were found to be significantly more in favour of raising the drinking age ($r = .16$) and doubling the penalties for impaired driving ($r = .14$), but they attributed no greater effectiveness to these measures than less concerned drivers. According to Questionnaire I ($N = 338$) and Questionnaire III ($N = 613$) data, concern for road safety was found to be higher in older drivers ($r = .26$, $.15$), in those with relatively low annual mileages ($r = .10$, $.14$) and in females ($r = .09$, $.14$). No significant association with educational level or age of the car usually driven was observed.

DIMENSIONAL STRUCTURE OF PUBLIC OPINION

Inspection of the intercorrelation matrix of Questionnaire II believed effectiveness ratings revealed an absence of significant negative coefficients. A similar pattern was found in the intercorrelations between the favourability ratings: many large positive coefficients and few negative ones. In order to verify whether the lack of marked negative correlations was masked by the possible operation of response set (scale checking style), all individual ratings were ipsatised (i.e. each rating made by the subject was expressed in terms of its difference from the average rating of that subject across all items), and again subjected to intercorrelation analysis. Here again, marked negative coefficients failed to produce themselves, indicating that there is no distinct 'ideological polarisation' in the driving public regarding preferred countermeasures: those individuals who favour a particular countermeasure are not strongly inclined to reject another.

Principal component factor analyses with Varimax rotation led to seven identifiable factors in public opinion concerning traffic accident prevention: public transport, driver and vehicle checks, lower speed limits, mass media safety persuasion, reducing the presence of alcohol, stricter age limits, and promotion of seat belt use. All seven could be clearly identified in all three separate factor analyses. Together they account for approximately 40 per cent of the total variance.

RELIABILITY CHECKS

Responses of Questionnaire I subsample of 120 Kingston drivers were compared with 228 Ottawa drivers. No significant differences in concern scores were observed.

When the believed effectiveness ratings obtained from Kingston drivers were compared with those from Ottawa, only one item (no 22; seat belt ignition interlock) was found to produce significantly higher scores in the former group ($p < .03$). In terms of the average favourability scores, no significant differences for any of the 40 individual items were found between the two geographical separated samples.

These results seem to indicate that some geographic differences may exist, but they do not appear to be very marked in magnitude. For the purposes of data analysis in this investigation, the Kingston and Ottawa data were amalgamated, assuming that the very few differences found among the 80 individual comparisons made could be attributed to chance. A comparison of the demographic characteristics listed in Questionnaires I, II and III, did not produce any significant differences between the Ottawa and Kingston samples.
The stability of the ranking of the believed effectiveness and favourability ratings over time was investigated by comparing the Questionnaire II (N = 337) and Questionnaire III (N = 613) data. Rank order correlations of the median degree of believed effectiveness and the median favourability were \( \rho = +.92 \) in both cases.

**DISCUSSION OF SOME MAJOR FINDINGS AND THEIR IMPLICATIONS**

Drivers differ markedly in their concern for road safety. An individual characterised by a high level of concern may be described as somebody who maintains the view that the general potential for traffic accidents is great. He reports that he experiences a considerable amount of anxiety when driving and that he makes many efforts to reduce the likelihood of having an accident and to minimise accident severity. He views his chances of being hurt or killed in a traffic accident as relatively low when he compares his chances with those of the average driver. Thus, it may be inferred that he views the causation of accidents as due to human action, and not to such factors as pure chance, fate, or unpredictable vehicle malfunctioning. It may also be deduced that his own actions to avoid accidents and reduce accident severity in his opinion are successful in lowering his subjective accident risk.

On the other hand, a driver who is unconcerned about road safety is someone who says that the roads are relatively safe and that he experiences little anxiety when driving. This person reports taking few initiatives to reduce accident likelihood or accident severity, and he believes that his chances of getting hurt or killed are relatively high when he compares himself with the average driver.

If it may be assumed that the observed association between the perceived potential of accidents and the inclination to take precautionary action is causal in nature, that is, if high perceived risk leads to behaviour aimed at the reduction of accident likelihood, an important implication may be identified. The frequency of cautious behaviour in the driver population can be enhanced by bringing about an increase in the public's perception of general accident risk.

A second implication may be derived if the same type of reasoning applies to the association between the belief that accident potential can be reduced through appropriate individual action and the actual commitment to such action. Thus, the prevalence of cautious behaviour might be enhanced by deliberate efforts to persuade the driver population that the individual driver has considerable control over the magnitude of his accident likelihood and that accident tolls can be cut through appropriate individual action.

Accordingly, it would seem to be in the interest of road safety, if the news media were to give more space and time to the reporting of traffic accidents. At present, the general attitude of newsmen, an attitude that has at least the merit of being diametrically opposed to sensationalism, seems to be a tendency to report only few of the accidents that do occur and to mention only the most serious ones. Of the 396 police recorded accidents that occurred in September, October and November 1974 within the limits of a city in Eastern Ontario, only 9 per cent were mentioned in the local newspaper and considerably less still in radio or television newscast. This state of affairs, if found to be true throughout the country, may well lead to a disproportionately low level of general accident risk as perceived by the public. Furthermore, it would seem that most accident reporting in the mass media is of little instructive or educational value to the reader, viewer or listener. Accident reports generally do not contain information that would enhance public awareness that many accidents can be avoided and the seriousness of consequences reduced through active efforts on the part of the driver and which actions are appropriate for this purpose. In other words, one of the most salient components of effective mass communication for the promotion of safety, that is concrete instructiveness of the message, is absent in the everyday newscasting of accidents. It would seem worthwhile to investigate how this situation could be altered.
If efforts toward a more educational journalism hinted at above, as well as other forms of informing the public such as road safety campaigns, were to successfully increase risk perception and the other components of concern for road safety, individual differences in this trait would likely continue to exist, but the average level throughout the population would be raised.

This study found evidence that individual differences in safety concern are related to some demographic variables. Women tend to be more concerned, and so do older people. Individuals who accumulate large annual mileages tend to be less concerned. It should be noted, however, that all of these associations are weak. The association with age is largely due to a small proportion of the drivers under twenty-five who have extremely low scores for concern. No association was found with the age at which the individual obtained his driver's licence, his place of residence, the age of the car he usually drives, or his level of education. This pattern of findings would seem to reduce the desirability of addressing efforts to increase safety concern in particular population subgroups that can be easily identified. Instead, it would seem that such efforts should be directed at the population as a whole.

Concern for traffic safety was found to be positively related to the degree of effectiveness in saving lives attributed to potential public policy safety measures. Also, highly concerned people are more strongly in favour or less often opposed to the implementation of public policy countermeasures against accidents. In fact, the degree of favourability towards a particular countermeasure can be predicted with a greater or lesser degree of confidence on the basis of concern scores and believed effectiveness ratings. Thus, concern is not only related to the tendency to take individual initiatives to reduce accident likelihood; concerned drivers also lend more support to public policies for this purpose.

The driver population as a whole, irrespective of individual levels of concern, was found to believe that the following five countermeasures contain the greatest promise for saving lives: a law that would make the use of seatbelts mandatory under any driving conditions; *doubling the present penalties for drivers impaired by alcohol*; requiring that all drivers be examined on eyesight and physical health every five years; requiring that all drivers take lessons to learn how to control a car in a skid; and the use of psychological tests to prevent those individuals from driving who are accident-prone, who have undesirable driving attitudes, or who are otherwise psychologically unfit to drive.

On the other hand, the measures that obtained the lowest ratings for believed effectiveness included: increasing the price of regular gasoline to $1.00 per gallon (note: the survey was held in February 1975 when the price was approximately $0.65); equipping all cars with running lights that turn on whenever the engine is running; demanding that anyone who has less than one year's driving experience be clearly visible as such to other drivers (for instance a large B for Beginner showing on the vehicle); the installation of traffic lights at twice as many street crossings as we have them now; and making the road test more difficult so that twice as many people will fail the driving examination the first time. Before we discuss possible uses of these findings we will first report on favourable opinions.

With respect to the questions that asked the drivers to indicate to what extent they were favourable or opposed to actual implementation of the potential public policy safety measures, it was found that the following five countermeasures enjoy the greatest amount of general public support: require that all drivers take lessons to learn how to control a car in a skid; provide more public transportation service (bus, streetcar, subway) in towns and cities; require that all drivers be examined on eyesight and physical health every five years; *double the present penalties for drivers impaired by alcohol*; and equip new cars with improved headlights for increased visibility at night. About 80 per cent or more of drivers were found to be either strongly or mildly in favour of implementation of these measures.

At the other end of the continuum, the following countermeasures were found to meet with the strongest opposition in the population as a whole: increase the price of regular gasoline to $1.00 per gallon; *double the price of all beverages containing alcohol*; raise the legal driving age from 16 to 21; prohibit all people 70 years of age or over from driving
a motor vehicle; and install traffic lights at twice as many street crossings as we have them now. Fifty per cent or more of those interviewed expressed mild or strong opposition against these potential safety measures.

It is obvious, of course, that public policies for the promotion of road safety should not be chosen and implemented on the basis of effectiveness beliefs or attractiveness in the general population. It would be foolish not to base such policies upon solid scientific evidence of their usefulness. However, when a particular safety measure is introduced on the level of education, legislation or engineering, it would also be unwise to disregard public views on whether the measure makes sense and the degree of popular support it enjoys. In fact, popular reaction should be researched and profoundly understood before the measure is launched so that the manner of propagation may be tailored to the peculiarities of public receptivity in view of maximising its beneficial effect. The understanding of public response may help design the manner of propagation of safety measures such that public resistance may be circumvented or reduced.

The reader's attention is drawn to the fact that there is only partial agreement between the average believed effectiveness rating of the countermeasures included in this study and the average favourability rating. For instance, mandatory seatbelt legislation is believed to be the most effective safety measure of all included, but it does not obtain a high favourability rating. Calculations of the strength of association between believed effectiveness and favourability revealed that in the case of some countermeasures an individual's favourability can be predicted reasonably well from knowing the amount of effectiveness he attributes to a given measure, but in other cases this is not so. This means that considerations other than safety play a major part when an individual is asked to express his degree of favourability and that these other considerations weigh more heavily in the minds of some drivers than of others. Also, it was found that some countermeasures were given much higher or lower average favourability ratings than one would expect on the basis of the average believed effectiveness rating of that measure. This is due to the non-safety benefits or costs as perceived by drivers.

Accordingly, countermeasures may be categorised as to whether the side benefits (over and above safety considerations) are positive or negative on the average. To the first category belong the establishment of a system of incentives and rewards for accident-free and violation-free driving, the provision of more public transportation service in towns and cities, and more frequent train service between cities. However, for all three it is found that drivers differ markedly from one another in the amount of non-safety benefit they perceive with regard to these measures. The second category, with negative side-benefits on the average, includes doubling the price of alcoholic beverages, raising the legal driving age to 21, mandatory seat belt use, and reduced speed limits on rural roads.

The countermeasures may also be subdivided according to whether the side benefits (positive or negative) are viewed similarly or differently by different drivers, (see the tau values in Table III). This issue of homogeneity or heterogeneity of perceived side benefits or costs is important because it indicates that subdividing the driver population into separate target audiences may be desirable if particular countermeasures are to be effectively propagated. Comparatively homogeneous views were found with respect to the placing of crosses or similar markers at road locations where fatal accidents have happened; raising the legal drinking age from 18 to 21; making it impossible for a car to start if the seatbelts are not properly fastened around the driver and the passengers; doubling the present penalties for drivers impaired by alcohol; and the use of psychological tests for driver screening. Comparatively heterogeneous views exist with regard to increasing the price of regular gasoline to $1.00 per gallon; providing more frequent train service between cities and more public transportation service in towns and cities; establishing a system of incentives and rewards for accident-free and violation-free driving; and passing a law so that drivers have to wear their seatbelts on the highways but not when driving in town.
This discussion of the role of safety considerations and of considerations other than safety only mentions those safety measures that obtained relatively conspicuous values and it should be realised that we are dealing with a continuum on which all forty measures occupy their relative position. The nature of the specific non-safety considerations that enter into drivers' judgments of favourability toward safety measures was not investigated in this study. Yet, some implications become readily apparent. Let us consider two examples. The propagation of countermeasures aimed at lowering the average cruising speeds on rural highways might profitably take account of the fact that the existing non-safety considerations increase the resistance against such measures. A study done elsewhere\textsuperscript{15} has shown that drivers often greatly overestimate the benefits of driving at high speeds. The time gained in actual fact is much less than what drivers believe to gain. Thus, mass education focussing on this aspect, may pave the way to greater willingness to adopt lower speeds.

The other example deals with seatbelts. Mandatory seatbelt legislation is viewed as the most effective means of promoting safety, but favourability is comparatively low. The non-safety benefits are viewed as predominantly negative and there is relatively marked agreement on this from driver to driver. One would be inclined to infer from this that it is not useful to propagate the use of seatbelts in public education campaigns by stressing that seatbelts save lives. People are already convinced of this. Instead such a campaign should be directed to the non-safety considerations, because these seem to determine a person's decision to wear or not to wear.

We will turn now to individual differences between drivers in believed effectiveness and favourability as related to their demographic characteristics. Women were found to generally attribute greater effectiveness to the potential countermeasures and to be more in favour of their implementation. Younger people were seen to have better opinions of some countermeasures, e.g. mandatory seatbelt use anywhere and prohibiting persons over 70 from operating a motor vehicle, and more opposed to measures such as a 60 mph speed limit on four-lane highways, psychological screening of drivers and raising the legal driving age to 21. The more education a person has the greater the support for mandatory seatbelt legislation and the greater the doubt that regular showing of pictures of wrecked cars and accident victims on television will be beneficial. Individuals who drive high annual mileages generally gave low believed effectiveness and favourability ratings, the major exception being the countermeasure that proposes to convert more two-lane highways into four-lane highways. Thus, those population subgroups in which relatively low levels of concern for road safety had been found, believed effectiveness and favourability ratings also tend to be low. It should be noted, however that the correlations between demographic data and the ratings are weak. The population subgroups were found to differ more in favourability toward the various safety measures than in opinion of effectiveness. It may be inferred that for the propagation of some countermeasures it will be useful to consider segmentation of the driver population into various subgroups and to concentrate efforts upon particular target audiences.

Several analyses were conducted in the framework of this study in order to determine what popular ideologies exist with respect to accident prevention. These analyses took the form of studying the patterns of interrelationships between the believed effectiveness ratings of the forty countermeasures. These ratings were subjected to factor analysis, and the favourability ratings were processed in a similar manner. Subsequently, a conjoint analysis of the effectiveness and favourability ratings was conducted which ascertained agreement between the effectiveness factors and the favourability factors. According to the findings obtained drivers may be categorised as to belonging to one or more of the following subgroups:

1. those who promote public transport both in and between cities and towns,
2. those who favour the institution of regular check-ups of both drivers and vehicles,
3. those who endorse the concept of lower speed limits,
4. those who favour the enhancement of safety persuasion through the media of mass communication,
5. those who feel that the drinking and driving problem should be reduced,
6. those who maintain that the legal driving and the legal drinking age should be raised, and
7. those who favour efforts to promote seatbelt use.

It should be noted that these popular ideologies of road accident prevention are characterised by both high effectiveness beliefs and strong favourability opinions, but also that they are not mutually opposed. Unlike other domains of major social, economic and political concern the road accident problem is at present not characterised by marked polarisation between popular ideologies regarding its prevention. The pattern of findings may perhaps be described as a situation of relative favouritism: different people cherish different policies for road accident prevention without vehemently rejecting alternative opinions supported by others.

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