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Evaluation of Queensland Defensive Driving Course

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Abstract

A Defensive Driving Course (DDC) comprising four two-hour lectures has been administered by the Queensland Road Safety Council since 1969. An evaluation of DDC road accident records for the 12 month periods before and after course attendance indicates that the DDC is not effective for reducing for 17-19 year olds or for females aged over 20 years. Significant accident reductions were found for male drivers aged 20-39 years who drive as part of their work but a benefit-cost analysis for this group concludes that the benefits of the accident reductions do not exceed the cost of the program.

Based on this analysis there is no economic justification for either the extension of such courses in Australia or for continuing the program in Queensland.

KEYWORDS:

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EVALUATION OF QUEENSLAND DEFENSIVE DRIVING COURSE

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January 1984.

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INTRODUCTION

THE DEFENSIVE DRIVING COURSE

The Defensive Driving Course (DDC) administered by the Queensland Road Safety Council is based on the course developed by the National Safety Council in the United States. The National Safety Council has run courses in the United States since 1965 and the courses were first introduced in Australia in 1969.

The definition of defensive driving promoted by the Queensland Road Safety Council is, "Driving in such a manner as to be able to prevent being involved in an accident in spite of the incorrect actions of others or the presence of adverse driving conditions."

The course consists of eight one-hour sessions. These sessions are held in two-hour periods over four weeks. Each session consists of lecture material and a film. Participants are issued with a Notebook and Manual in which they can record their own notes on the course in a structured framework. In addition the Notebook and Manual contain summaries of some aspects of each session and provide a summary of important traffic regulations.

The DDC is a lecture course which emphasises the theoretical aspects of driving rather than an advanced skills course which are practical courses that emphasise vehicle handling in hazardous situations. Until 1982 the DDC in Queensland was not aimed at rehabilitating 'problem' drivers although it has been used for this purpose in some areas of the United States.

It has been recognised since 1972 (Expert Group on Road Safety, 1972) that a study should be undertaken to assess the effectiveness of Defensive Driving Courses as implemented in Australia. The Office of Road Safety commissioned the study in February 1979. After an initial pilot study, data collection commenced in November 1979.

PROGRAMS AS EXPERIMENTS

B.J. Campbell (1974) advocates that driver education programs be "reviewed, analysed, and funded in accordance with their effectiveness, with adequate time and resources for experimenting to make ineffective programs effective rather than hastily abandoning them." He proposed that programs are perceived as experiments in which society is attempting to bring about reduced accidents. If the administrators and officials can regard programs as experiments then "it follows that (1) the necessary procedures can be inaugurated to record the outcome of the experiment and determine whether the experiment is a success or a failure; (2) we can remove some of the stigma of failure."

The importance and magnitude of the road accident problem demands an efficient search for effective programs. This requires a hard look at the philosophy - "this program is worthwhile if it will just save one life." We agree with Campbell that "such a philosophy <u>takes</u> lives rather than saves lives because it leads to uncritical support of a given program in the hope of saving one life, while ignoring other programs that could save ten lives with the same money."

Using this approach of progams as experiments, the DDC can be evaluated in terms of success or failure within various groups

groups for which the program is a success then the program can be expanded within that particular group. On the other hand if the program is a failure within a particular group then a search can be made for a more effective program for that group.

The concept of a program as an experiment requires careful attention to the research strategy used in the evaluation. Previous evaluations of the DDC have suffered from various methodological problems and hence the results of the evaluations have been open to criticism. To understand the deficiencies of previous evaluations requires a detailed examination of possible research designs. An examination of research designs forms the framework for the discussion of the relevant literature which provides support for the research strategy used for this particular study.

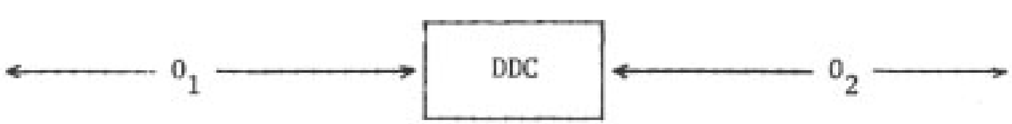
RESEARCH STRATEGY

The key factor in the evaluation of the DDC is the choice of the best available research strategy. The development and theoretical justification of this research strategy are outlined in this chapter. The strength and weaknesses of the strategy are incorporated into this discussion.

The first step in the justification for the research strategy used in the study requires a discussion of the sources of invalidity that could be present. The experimental design literature distinguishes both internal and external validities. Internal validity is concerned with plausible, rival explanations of any hypothesised treatment effect. External validity is the generalisation of any hypothesised treatment effect to a wider population. At this stage the discussion will concentrate on internal validity.

SOURCES OF INVALIDITY

In discussing possible sources of invalidity it is useful to consider a one-group pre-test post-test design. Consider a group of drivers who attend a DDC course and measurements of accident rates are taken for the twelve-month period before the course (0_1) and for the twelve-month period after the course (0_2).



A comparison of the accident rates 0_1 and 0_2 to represent the effect of the treatment could be invalid for the following reasons:

(a) History: changes in road conditions or traffic rules within the study period could invalidate the use of the comparison of 0_1 and 0_2 as a measure of the treatment effect.

(b) Maturation: an increase in driving experience between O_1 and O_2 could be a source of invalidity. This is especially relevant for young drivers who may have had only twelve months' driving experience at the time of undertaking the course. (Drivers with less than twelve months' experience have been excluded from the evaluation.)

(c) Instrumentation: changes in the measurement of accidents between the two periods. For example, on October 1, 1978 there was a change in the recording practices of accidents under Queensland law, due to an increase in the maximum property damage for reportable accidents from $300 to $1,000.

(d) Testing: another possible source of invalidity discussed in the experimental design literature is testing. This refers to the effects of psychological and education tests used as "before" measurements invalidating the use of these tests as "after" measurements. However, the effects of testing are likely to be small in the current evaluations since "testing" merely involves recording the number of accidents.

(e) Selection: an important source of invalidity is that DDC attendees are self-selected. This leads to problems both of internal and external validity. The problem of external validity is that DDC attendees may have different characteristics than the general driving population. This makes it difficult to generalise conclusions on the effect of the treatment to the wider population.

(f) regression artifacts: a further threat to invalidity in the one-group pre-test post-test design is statistical regression. If DDC attendees attend the course because they have a particularly high accident record, which becomes for them the O_1, then their subsequent accident record O_2 will almost surely average lower than did O_1. The problem of regression to the mean is imtimately related to the problem of selection. A group who self-select because of their extremity on a particular variable such as before accident record will regress towards the mean of the population from which it was selected. If DDC attendees as a group have a significant number of attendees who are motivated to attend by a recent accident experience, i.e. a significant number in the group have extreme measures on the pre-test measure, then the post-test measure of accident record will show a regression towards the mean of the population from which DDC attendees are self-selected.

(g) Attrition: if post-test measurements are not obtained from all subjects there may be a bias in the respondents who provide post-test measurements. For example, drivers with a poor post-test accident record may be less likely to respond to the post-test questionnaire.

POPULATION GROUP

The above considerations led to the choosing of a research strategy based on a classical pre-test post-test control group design. The major problem is the choice of a "control" group to compare with the group of drivers that attend the DDC. The ideal situation in the control group design is to have an equivalent control group design. In an equivalent control group design the experimental group and control group have the same characteristics prior to any interviews either by the design of the researchers or as a consequence of natural social events.

The classical approach to obtain an equivalent control group design is to have random assignment to the experimental and control group. Random assignment controls for selection differences between the groups. Then the rival explanation of the treatment causing differences between O_2 and O_4 is sampling error; and appropriate tests of statistical significance can be used to rule out this explanation.

However a randomised design was not available to the researchers for both reasons of ethics and practicalities. Given the DDC course is advertised widely to attract attendees, it just is not legitimate to deny some potential attendees the course solely to satisfy the needs of research. The best research design available to the research team for the DDC evaluation is, therefore, a non-equivalent control group design. The choice of this design is best summarised by Campbell (1969):

> "The general ethic, here advocated for public administrators as well as social scientists, is to use the very best method possible, aiming at 'true experiments' with random control groups. But where randomised treatments are not possible, a self-critical use of quasi-experimental designs is advocated. We must do the best we can with what is available to us."

The research strategy used by the researchers was to obtain a randomly selected group from the general driving population. The driving records of this group can then be compared with the driving records of the experimental group. This research strategy is illustrated in Figure 1.

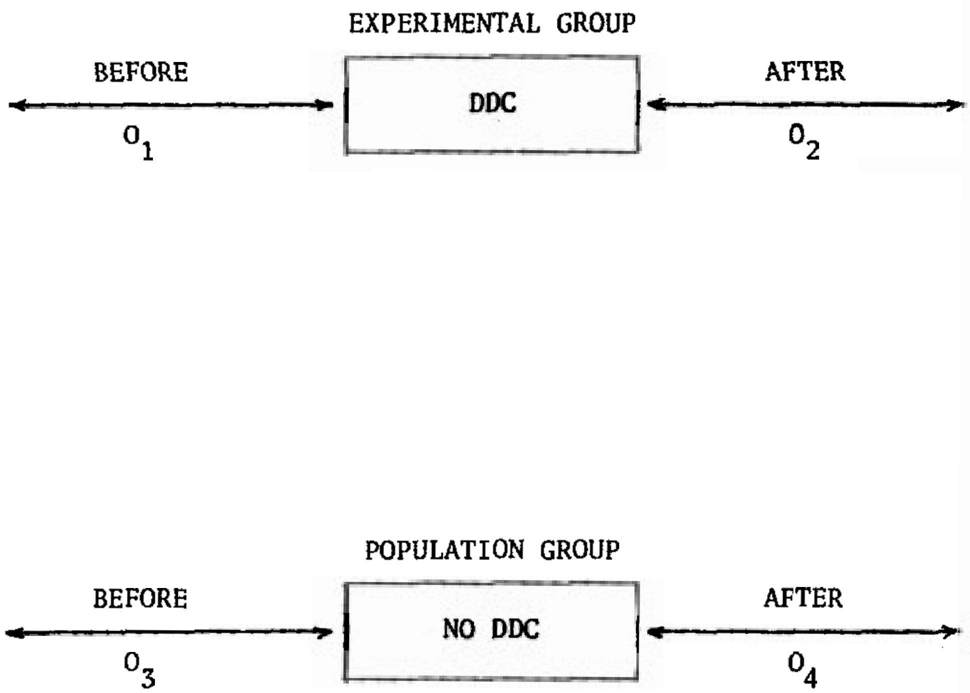


Figure 1: Research strategy.

This strategy controls for the main effects of history, maturation, instrumentation and testing. History is controlled insofar as general events that might have produced an O_1-O_2 difference would also produce an O_3-O_4 difference. Maturation, testing and instrumentation are controlled in that they should be manifested equally in the experimental and population groups. However the continuing threats to validity of selection, regression artifacts, and attrition require further discussion.

For the non-equivalent control group design, selection provides the greatest threat to validity. The DDC attendees are either volunteers who self-select to attend the course or non-volunteers who are selected to attend by their employers. In either case this selection process is likely to produce pre-intervention differences between the experimental group and the population group. Given that a randomised design is not feasible it is important to recognise the limitations of the research strategy and control for the selection differences by analytical methods. In effect the selection differences become the major factor in the analysis of the data. This matter is discussed in greater detail after an analysis of the pre-intervention differences between the groups.

One possible approach to the problem of selection differences is to choose a "matched" group from the random population group to use as a "control" group. The "matched" group could be determined by first matching on the pre-test accident record. In addition the matching process could take account of pre-intervention differences such as sex, age, driving exposure and driving experience.

There is some discussion in the experimental design literature on the advantages and disadvantages of this approach. Campbell and

Stanley (1966) claim that, although matching may reduce invalidities due to selection, it produces new sources of invalidity. Kenny (1975) claims that "matching should be rejected out of hand" and Reichardt (1979) discusses the problems of obtaining an idiosyncratic comparison between the two groups due to losses in the matching process.

Campbell and Stanley (1966) consider the problem of matching in evaluating the effect of psychotherapy of a group of patients who seek psychiatric treatment. Consider comparing this group with a matched group from the general population; matched on scores on appropriate psychological tests. Both groups will have extreme scores but the group from the general population is likely to regress towards the mean by a greater amount because it comes from a population with a higher mean score. Use of this matched group as the control group could lead the researchers to conclude that the effect of treatment is ineffective when in fact it may be effective. This would be a Type II error. It would be extremely unfortunate to conclude that the programme was ineffective due to the use of inappropriate methodology such as matching. The overall emphasis of the experimental design literature is that there are more effective ways than matching to control for pre-treatment differences between the groups. The appropriate way to handle the problem is by analytical methods.

Even with an <u>equivalent</u> control group design there are problems of attrition. Although the groups are equivalent for the pre-test this equivalence may not be maintained on the post-test if there are differential attrition rates for each group. As with a randomised design the non-equivalent group design may have a source of invalidity due to differential rates of attrition. Problems due to drivers not driving in the post-test period can be controlled for in self-reported accidents by asking if the respondents have been driving in the after period.

COMPARISON GROUP

An alternative methodology to overcome selection bias is to add a comparison group to the non-equivalent control group design. This comparison group is a group of drivers who attended DDC twelve months later than the experimental group. This is based on the recurrent institutional cycle design suggested by Campbell and Stanley (1966) and is the research strategy used in a major evaluation of DDC by Planek (1972) for the National Safety Council in the United States.

The relationship of the comparison group to the research strategy is shown in Figure 2. Following Planek (1972) the before accident records of the comparison group (O_5) can be compared with the after accident records of the DDC group (O_2). The difficulties in making this comparison are discussed further in the analysis.

SUMMARY

The research strategy used in this evaluation is the non-equivalent control group design illustrated in Figure 1. In addition a comparison group has been studied so that the results can be compared with the literature (Figure 2).

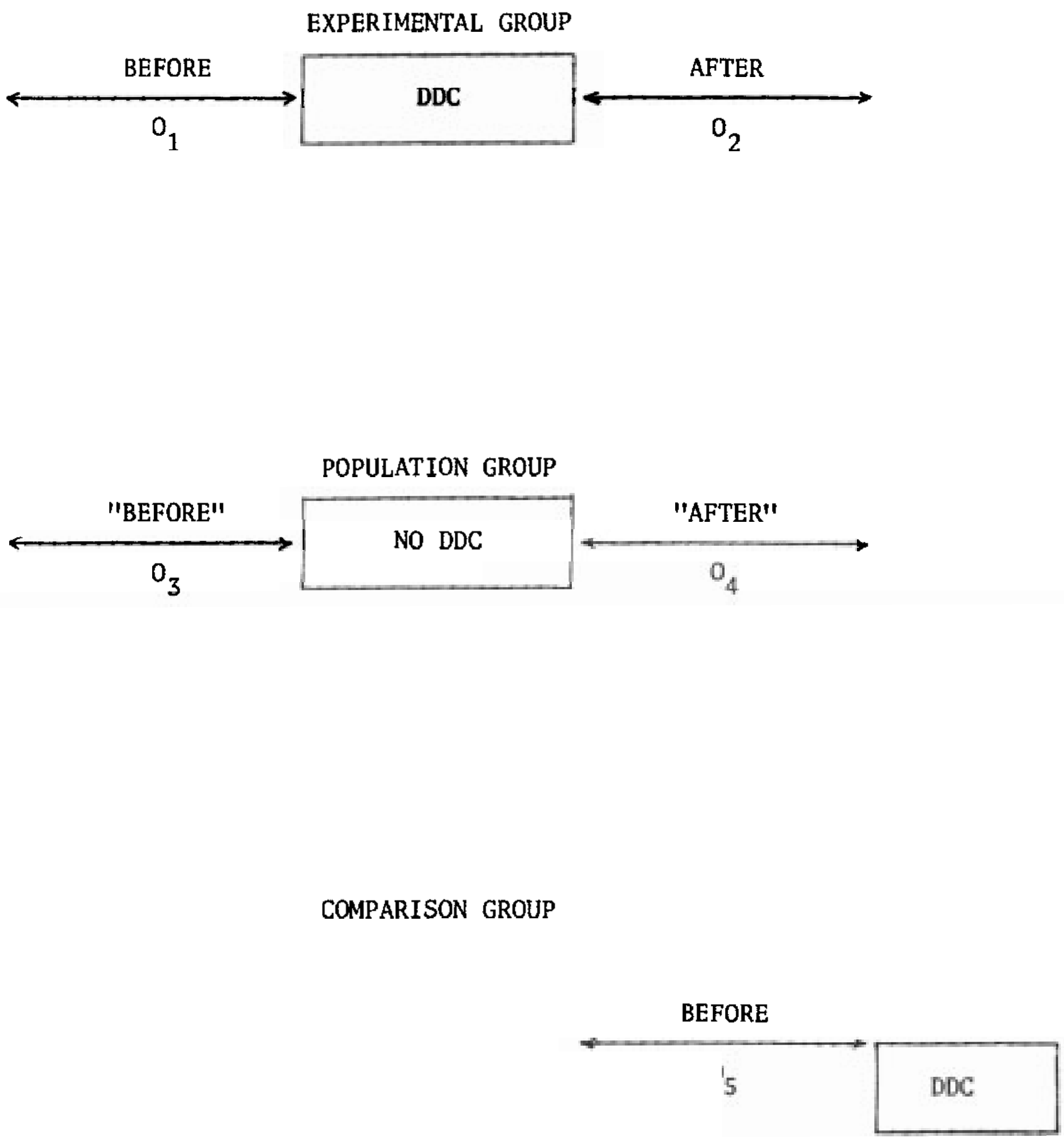


Figure 2: Relationship of the Comparison Group to the research strategy.

PREVIOUS STUDIES

Since its introduction in 1965 by the National Safety Council the Defensive Driving Course has been widely adopted in the United States and reports of its success in reducing accidents led to its adoption in other countries. However, an examination of articles reporting on the success of the DDC reveals that many of these are merely promotional (Showalter, 1969) or political (Scott, 1970). Some of these articles contain little evidence of DDC's effectiveness; instead there is a strong presumption that the course is successful in reducing accidents. At the extreme, enthusiastic proponents of DDC repudiate the necessity for scientific evidence of the effectiveness of the course. Showalter (1969), DDC project director of the Tacoma-Pierce County Safety Council states:

> "I'm talking to this research type. He is saying, in effect, that until data-processed reports are in, there is no way of determining whether the teaching of defensive driving is effective or not. The only answer I have for him, or for any detractor of DDC, is that we go right on teaching - where the action is."

However, evaluative studies of driver improvement programmes have been accumulating for several decades. Overall, the results are equivocal and do not clearly demonstrate a direct and substantial improvement in driver safety from educational courses.

A major barrier to conclusive evaluation of DDC has been inadequacies in research design which have left the findings of particular studies open to criticisms of bias or to alternate explanations. This is due to the many factors that make research in this area difficult.

Some of these factors are:

(a) impossibility in many studies to have random assignment of drivers to DDC and non-DDC experiences, i.e. to have an equivalent control group design.

(b) Given a non-equivalent control group design the large number of potentially confounding variables to be controlled for; for example, age, sex, driving experience, driving exposure, personality characteristics, etc.

(c) difficulties in measuring accidents and hence differences between self-reported and officially recorded accidents/ violations.

(d) response rate bias in studies using self-reported accidents.

(e) large sample sizes necessary for sound statistical analysis (since accidents are infrequent occurrences in a population).

(f) the various settings in which the evaluations are undertaken.

In the United States the DDC course has been evaluated in four different settings. They are as follows:

(i) driver improvement programme for the general population.

(ii) driver improvement programme for particular occupational groups.

(iii) driver rehabilitation programme for drivers who are assigned to the programme by the courts.

(iv) driver education programme in conjunction with school-based driver education.

The discussion of previous studies will be considered within each of these settings. In each case the research design for the particular

EVALUATIONS OF DDC FOR THE GENERAL POPULATION

The major evaluation of the DDC course for the general population was the study undertaken by Planek, Shupack and Fowler (1972) for the National Safety Council. This evaluation uses two comparisons:

(a) a comparison of self-reported accident and violation rates from the twelve months before and after taking DDC. (A comparison of O_1 and O_2 in the research strategy of Figure 2.)

(b) a comparison of the "after DDC' rates for the experimental group with the "before DDC" rates of drivers attending DDC twelve months later. (A comparison of O_2 and O_5 in the research strategy of Figure 2.)

For the first comparison the study obtained before and after records for 5,921 DDC attendees who reported 32.8 per cent fewer accidents and 24.9 per cent fewer violations in the twelve-month period following the course. The Planek Study found that the DDC reduced accidents significantly for both males and females in the study group. The reductions were significant across various age levels with drivers 25 and over showing the greatest reduction. Both groups of drivers who volunteered for the course and those sent by their employer showed significant reductions. This comparison is a one-group pre-test post-test study and hence suffers from the methodological problems discussed in the previous chapter. The major rival hypothesis to the effectiveness of the DDC is regression to the mean.

For the second comparison this evaluation found significantly lower accident and violation studies for the study group than the comparison group who did not take DDC. A major problem with this comparison is that no account was taken of the demographic and driving exposure variables between these two groups.

An earlier evaluation of the DDC for the general population was undertaken by the M.W. Menzies Group (1971) in Manitoba, Canada. The Menzies Study was also a one-group pre-test post-test study involving 2,155 DDC attendees. The evaluation found a 32.6 per cent decrease in accident rates and a 22.4 per cent decrease in conviction rates but the research strategy has similar methodological problems to the Planek Study.

EVALUATION OF DDC FOR OCCUPATIONAL GROUPS

An early study of DDC was undertaken by O'Day (1970) involving primarily civil servants. This evaluation was a one-group pre-test post-test design. The results actually showed an increase in accident rates after the course. The results of the study are at variance with other studies of similar design which tend to show significant reductions in accident rates in the post-test period.

EVALUATION OF DDC IN CONJUNCTION WITH DRIVER EDUCATION

The research department of the National Safety Council have undertaken two evaluations of DDC as an adjunct to high school driver education (Planek and Shupack, 1974; Shupack and Planek, 1975). In the first study DDC was compared with a placebo driver education course and in the second study the DDC attendees were compared with students attending their normal social studies class. In both studies the self-reported accident data showed no significant differences between the groups. These results were confirmed by an examination of official accident records.

EVALUATIONS OF DDC AS A REHABILITATIVE MEASURE

In some states of the United States DDC has been used as an alternative to licence suspension or as a rehabilitative measure for traffic violators.

Coppin, Marsh and Peck (1975) in Sacramento, California compared the DDC course with an alternative rehabilitative programme and a control group who did not undertake any programme. The group attending DDC showed a greater reduction in traffic accidents after the course than the control group.

A study was undertaken by Prothero and Seals (1977) in the state of Florida. This study compared the DDC course with a "responsible driving course" based on the principles of transactional analysis. This evaluation showed that the latter programme was more effective in reducing post-course accidents.

A study was undertaken in the state of Oregon (Kaestner, 1980) where the DDC course was compared with a group of drivers who attended a Traffic Violator Workshop and another group of drivers who were randomly assigned to a control group. The results of this study showed that the DDC group had better accident and violations records on the year after the course than the control group (46 per cent versus 39 per cent drove without a citation for a moving traffic violation or a chargable accident).

SUMMARY

In reviewing research on DDC in 1972, Planek et al. begin with the words, "Previous efforts to evaluate DDC have been non-conclusive."

In this brief review of the literature a decade later the results of the DDC evaluations are still inconclusive.

METHOD

DEFINITION OF AN ACCIDENT

In planning the study, considerable work was done on the measurement of accidents for the study. In the original research proposal it was proposed that the project would rely on the official accident records of the Traffic Branch of the Transport Department in the State of Queensland. The definition of an accident event used for the reporting of accidents in the State of Queensland is defined in Section 3 of the Traffic Act:

> "The driver of any vehicle, tram or animal involved on any road of of any motor vehicle involved elsewhere than on a road in an accident resulting in injury to or death of any person or damage, to an extent apparently in excess of the prescribed sum, to any property (including any animal in the charge of any person, a vehicle or a tram) shall report the incident to the Superintendent who is the Officer in Charge of the nearest Police Station or to any other member of the Police Force as soon as reasonably practicable after the occurrence thereof."

The prescribed sum was $300 prior to October 1, 1978 but this sum was increased to $1,000 from that date. This had substantial implications for the study because the incidence of accidents in the population would be lower with a limit of $1,000 compared with $300. Hence the sample size required to undertake a valid study relying on official accident records under the new limit would be much greater. The time period required to obtain this larger sample size would have been much longer and impractical. In addition the official records were kept manually and it would have been very difficult to extract data on the cost of accidents.

In the exploratory stages of the study it was also determined that the information on the rolls of attendees maintained by the Queensland Road Safety Council was inadequate to collect reliable information on the official accident records of DDC attendees. To collect data from the Traffic Branch it is necessary to have full names rather than just name and initials and it is useful to have date of birth. Also an important variable in the analysis is the volunteer/non-volunteer status of the attendees. It would not be possible to determine this from either the DDC rolls or the official accident records.

For the above reasons, the research team decided that it would be necessary to survey DDC attendees by a self-administered questionnaire. This questionnaire was administered to DDC attendees (from November 1979 to October 1980) who became the Experimental Group and the non-DDC attendees (from November 1980 to October 1981) who became the Comparison Group.

The definition of an accident used in the survey was taken from Planek et al. (1972). The question used to collect accident data was:

> "During the last twelve months, how many traffic accidents have you been involved in while you were driving? Include even the most minor accidents not requiring a report to the police or an insurance company. (Example: You bend your bumper bar against a tree while parking and sustain $10 worth of damage to your car. Because the damage is so minor you decide not to have it repaired.")

This provides a fairly broad definition of an accident event but the definition can be made more rigorous by incorporating the cost data available for each reported accident. Various definitions of an accident event could have been used but the final analysis considers:

(a) self-reported accidents in response to this question.

(b) self-reported accidents with property damage of $300 or more and/or personal injury.

RESPONSE RATES AND STUDY SIZES

Experimental Group

The target population for the experimental group was the attendees at the DDC course in the period from November 1979 to October 1980. The total number of attendees during this period was 4,311. Of attendees, 87 per cent completed the questionnaire which was administered in the second week of the four-week course. This eliminated the possibility of selecting attendees who attended the first session and then abandoned the course.

An after questionnaire was sent to the DDC respondents twelve months after attending the DDC in the period November 1980 to October 1981. Seventy-seven per cent of this group (2,883 attendees) responded to this second questionnaire.

This group that completed both before DDC and after DDC questionnaires were asked if they had been driving in the twelve-month periods before DDC and after DDC. There were 804 attendees who were not driving in one or both of these periods and these respondents were excluded from the experimental group. The final number available for the experimental group was 2,079.

Population Group

The population group was selected by taking a random sample of Queensland drivers from the licence records of the Queensland Traffic Branch. A major problem was that, until recently, Queensland drivers had to renew their licences at ten-year intervals. In 1979/1980 when the population group was chosen the drivers' licence records included a large number of out-of-date and incorrect records. Hence the sampling frame included the dead, the aged who no longer

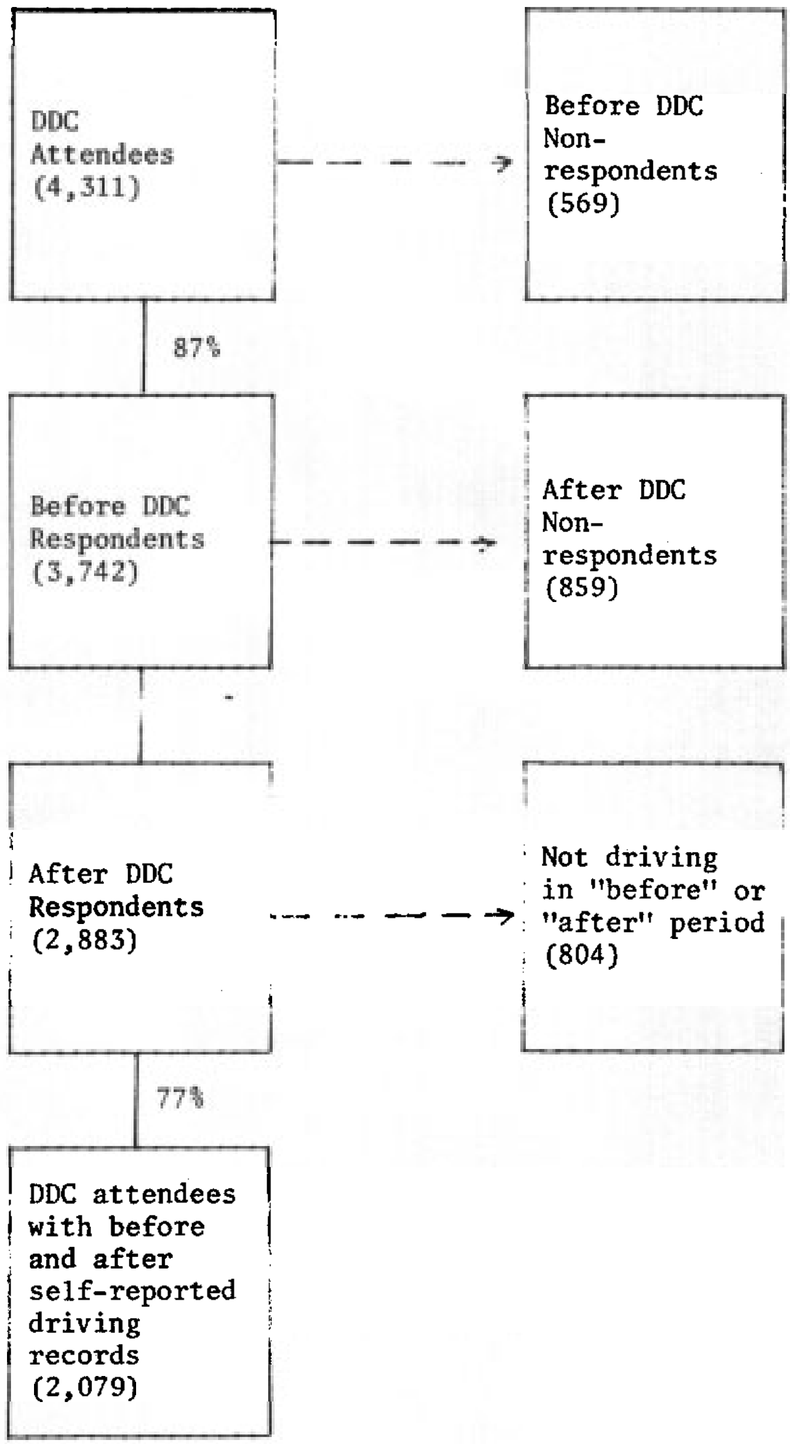


Figure 3: Numbers available for the Experimental Group.

drive, those who have moved interstate and those who could not be located at the address given on their licence record. This provides difficulties in determining response rates for this group. There were 15,624 letters sent to people from the drivers' licence files in the period November 1979 to October 1980. Of these letters 2,210 were returned to the project as dead or no longer at this address. The number of completed questionnaires returned was 7,370.

It could be said that this group is not representative of the Queensland driving population due to deficiencies in the sampling frame. However, the research strategy does not require that a representative sample is obtained; rather that a group is obtained whose before and after driving records can be compared with the experimental group. If there are differences between the two groups on such key variables as sex, age and driving exposure then these should be accounted for in the analysis.

Of the 7,370 respondents completing before questionnaires, 5,164 or 70 per cent completed the second after questionnaire. These questionnaires were mailed twelve months after the before questionnaire in the period November 1980 to October 1981. Of these respondents, 1,457 were not driving the the before and/or after period and were not included in the population group. The final number available for the population group was 3,707. The numbers available and the response rates for the population group are summarised in Figure 4.

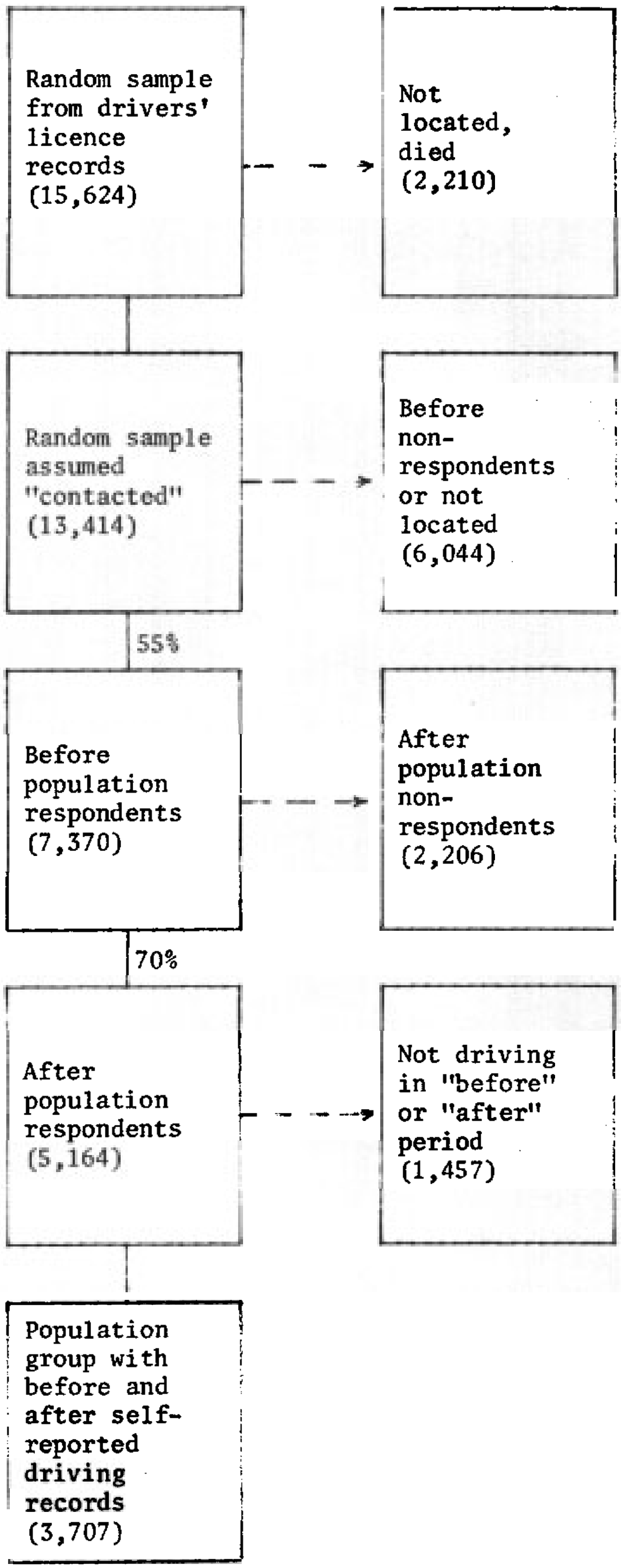


Figure 4: Numbers available for the Population

Comparison Group

The target population for the comparison group were the attendees at the DDC course in the period from November 1981 to October 1982. The total number of completed questionnaires for the comparison group was 2,503. Of the respondents, 676 were not driving in the twelve-month period before the course and the final number available for the comparison group was 1,827.

The procedure for data collection is summarised in Figure 5.

Data collected \ Group	Experimental Group	Population Group	Comparison Group
Drivers' licence records		A random sample of Queensland drivers was chosen from the drivers' licence records	
Self-reported accidents (before)	Self-administered questionnaire at DDC lectures November 1979-October 1980	Mail questionnaire November 1980-October 1981	Self-administered questionnaire at DDC lectures November 1980-October 1981
Self-reported accidents (after)	Mail questionnaire November 1980-October 1981	Mail questionnaire November 1980-October 1981	

Figure 5: Data collection procedure.

PROFILES OF THE STUDY GROUPS

In this chapter the three groups (experimental, population and comparison) are compared on a number of demographic and driving exposure variables.

EXPERIMENTAL AND POPULATION GROUPS

The sex and age distributions for the experimental and population groups are given in Tables 1 and 2. The experimental group has a higher proportion of males (70 per cent compared with 55 per cent in the population group). The age distribution shows that there is a higher proportion of 17-19 year olds in the experimental group and a higher proportion of 40-79 year olds in the population group.

The comparison of accident rates will take into account the differences in the sex and age distributions between the two groups.

There are large differences between the two groups in driving exposure. In response to the question:

> "Do you drive a vehicle as part of your work?"

53 per cent of the experimental group responded "Yes" while only 33 per cent of the population group responded "Yes". These results are shown in Table 3. Again this difference in driving exposure between the two groups will be considered in the comparison of accident rates.

An alternative measure of driving exposure was the response to the question:

> "During the last twelve months, how often did you drive a motor vehicle?"

The results are given in Table 4. There are no significant differences.

TABLE 1

SEX DISTRIBUTION: EXPERIMENTAL AND POPULATION GROUPS

Sex	Experimental Group		Population Group	
	Number	%	Number	%
Male	1,450	70	2,032	55
Female	629	30	1,675	45

Chi-square = 123.9 with 1 df; $p < 0.001$.

TABLE 2

AGE DISTRIBUTION: EXPERIMENTAL AND POPULATION GROUPS

Age	Experimental Group			Population Group		
	Number	%		Number	%	
17-19	285	14		285	8	
20-24	271	13	25	508	14	24
25-29	241	12		383	10	
30-39	500	24		847	23	
40-79	770	37		1,670	45	
Not known	12	1		14	0	

Chi-square = 73.7 with 5 df; $p < 0.001$.

TABLE 3

DRIVING AS PART OF WORK: EXPERIMENTAL AND POPULATION GROUPS

Driving as Part of Work	Experimental Group		Population Group	
	Number	%	Number	%
Drive	1,095	53	1,215	33
Do not drive	984	47	2,492	67

Chi-square = 268 with 2 df; $p < 0.001$.

TABLE 4

DRIVING FREQUENCY: EXPERIMENTAL AND POPULATION GROUPS

Driving Frequency	Experimental Group		Population Group	
	Number	%	Number	%
Almost every day	1,648	79	2,896	78
Several times a week	335	16	639	17
About once a week	66	3	98	3
Less than once a week	11	1	37	1
No response	19	1	37	1

Chi-square = 6.2 with 4 df; $p > 0.10$.

between the two groups on this driving exposure variable. This variable will not be subject to further consideration in the comparison of accident rates between the two groups.

The previous accident records in the twelve months before DDC of the experimental and population groups are given in Table 5. The experimental group has a greater percentage of drivers with two accidents and a greater percentage of drivers with two or more accidents. The previous violation data given in Table 6 show that the experimental group has a smaller percentage of violations in the before period than the population groups.

These previous accident and violation records depend on age, sex and driving exposure variables which have been shown to differ significantly between the experimental and population groups. The multivariate nature of these relationships will be accounted for in the subsequent analysis.

The chapter on research strategy explained that the only strategy available for the study was a non-equivalent group design. A major task in the analysis is to take account of these differences between the two groups in comparing accident rates in the period after the DDC course.

TABLE 5

SELF-REPORTED ACCIDENTS: EXPERIMENTAL AND POPULATION GROUPS

Self-reported Accidents in Before Period	Experimental Group		Population Group	
	Number	%	Number	%
None	1,604	77	3,080	83
One	360	17	517	14
Two or more	115	6	110	3

Chi-square = 38.3 with 2 df; $p < 0.001$.

TABLE 6

SELF-REPORTED VIOLATIONS: EXPERIMENTAL AND POPULATION GROUPS

Self-reported Violations in Before Period	Experimental Group		Population Group	
	Number	%	Number	%
Violation	1,777	86	3,247	88
No violation	302	14	460	12

Chi-square = 5.04 with 1 df; $p < 0.05$.

EXPERIMENTAL AND COMPARISON GROUPS

The experimental and comparison groups are examined on the key variables of age and sex in Tables 7 and 8.

The experimental group has a higher percentage of males, 70 per cent, than the comparison group, 62 per cent. The comparison group has a higher percentage of 17-19 year old drivers, 22 per cent, compared with 14 per cent for the experimental group. For the comparison group there is a lower percentage of drivers in the 20-39 year age group (45 per cent compared with 49 per cent) and a lower percentage of drivers in the 40-79 year age group (32 per cent compared with 37 per cent).

A comparison of the previous accident and violation records of the two groups is not applicable since the "before" accident record of the comparison group will be compared with the "after" accident record of the experimental group in the analysis section. The differences between the two groups with regard to sex and age will be taken into account in comparing the accident rates for these two groups.

TABLE 7

SEX DISTRIBUTION: EXPERIMENTAL AND COMPARISON GROUPS

Sex	Experimental Group		Comparison Group	
	Number	%	Number	%
Male	1,450	70	1,114	62
Female	629	30	713	39

Chi-square = 32.8 with 1 df; $p < 0.001$.

TABLE 8

AGE DISTRIBUTION: EXPERIMENTAL AND COMPARISON GROUPS

Age	Experimental Group		Comparison Group	
	Number	%	Number	%
17-19	285	14	404	22
20-24	271	13	297	16
25-29	241	12	207	11
30-39	500	24	328	18
40-79	770	37	585	32
Not known	12	1	7	0

Chi-square = 83.7 with 6 df; $p < 0.001$.

COMPARISON OF ACCIDENT RATES

The evaluation of the DDC course involves a comparison of the accident rates between the experimental and population groups. The criterion variable for the comparison of the experimental and population groups is the percentage of drivers who have accidents in the twelve-month period "after DDC". This is the twelve-month period after the DDC course for attendees and the corresponding period for the population group who have no exposure to DDC. In terms of the research strategy outlined in Figure 2 this is a comparison of O_2 and O_4.

The discussion of the profiles of the experimental and population groups in the previous chapter showed that there are significant differences between the two groups in sex, age, driving exposure and previous accident record. A comparison of after accident rates must allow for these differences between the two groups.

ANALYSIS OF PREVIOUS ACCIDENT RECORD

The initial analysis, presented in Table 9, cross-classifies the data by previous accident record. To account for the before accident record the analysis is divided into respondents with no accidents in the before period and respondents with accidents in the before period.

For those respondents with no before accidents, 243 of the 1,604 DDC attendees (or 15 per cent) in this category had an accident in the period after DDC. On the other hand 391 of the 2,689 non-DDC respondents (or 13 per cent) had an accident in the after period. The statistical significance of the treatment effect for this analysis can be tested using a chi-squared statistic. The value for chi-square

TABLE 9

COMPARISON OF ACCIDENT RATES: EXPERIMENTAL AND POPULATION GROUPS

	Treatment	After Accident Record		Percentage with Accident	Chi-squared
		No Accident	Accident		
No accident	DDC	1,361	243	15	5.4*
	No DDC	2,689	391	13	
Accident	DDC	349	126	26	0.3
	No DDC	451	176	28	

*Significant at the 0.05 level.

It would seem unlikely however that exposure to DDC should increase the accident rate in the after period. The subsequent analysis of the group with no before accidents is designed to see if this result continues to hold after cross-classifying the data by the key variables identified in the previous chapter as likely to affect accident rates.

For drivers <u>with before accidents</u> the accident rate of DDC attendees is 26 per cent compared with 28 per cent for the population group. Although this result is in a direction favouring DDC attendees, it is not statistically significant even at the .10 level.

ANALYSIS BY AGE AND SEX

In the chapter on profiles of the experimental, population and comparison groups it was shown that there are variations between the groups on the key variables of age and sex. In addition, there are differences on driving exposure variables. As explained in the chapter on research strategy this is a comparison of accident rates for non-equivalent groups.

A number of analyses were undertaken for various age groups. From these analyses the age groups were collapsed into three groups: 17-19, 20-39 and 40-79. The first step is to consider the accident rates for various sex and age groups. The results for males are given in Figure 6 and Table 10 and for females in Figure 7 and Table 11.

For those male respondents in the 20-39 year age group with <u>no before accidents</u> DDC attendees have a lower accident rate in the after period than the population group (14 per cent compared with 17 per cent). The chi-squared statistic for this group is 1.8 which is not significant at the 0.10 level of significance. The 40-79 age group show little difference in accident rates (11.7 per cent compared with 10.3 per cent). However, for the 17-19 age group the after accident rate of the DDC attendees is 37 per cent compared with 27 per cent for the population group. This is a significant difference at the .10 level.

For female respondents with <u>no before accidents</u> there is no difference for the 20-39 or 40-79 age group, but for the 17-19 age group the DDC attendees have an accident rate of 29 per cent compared with 16 per cent of the population group. This result is significant at the .10 level.

In summary, this analysis by age and sex for drivers with no before accidents shows a small but statistically non-significant result favouring DDC attendees for males in the 20-39 age group and no difference in accident rates for the 40-79 age group. The unexpected result for the no before accident group holds only for the 17-19 age group for both sexes and then is significant only at the .10 level.

For the drivers with before accidents the aggregate analysis showed little difference in accident rates. The analysis cross-classified by sex and age shows a favourable result for male respondents aged 20-39, 23 per cent compared with 30 per cent, and no difference for the 40-79 age group. Again the 17-19 age group shows an unfavourable result although the difference is not statistically significant. For females there are no differences in accident rates.

In summary, for the with before accident group the analysis by age and sex identifies the males aged 20-39 as a group for which the DDC course may be effective in reducing accident rates.

ANALYSIS BY DRIVING EXPOSURE VARIABLES

The comparison of the accident rates of the experimental and population group may be confounded by differences in driving exposure between the two groups. One measure of driving exposure is driving as part of work. In cross-classifying by driving as part of work in addition to treatment, sex, age and before accident record the numbers are small so that even a 10 per cent difference in the after accident rates may not be statistically significant.

FIGURE 6

Accident Rates by Age - Males (Experimental and Population Groups)

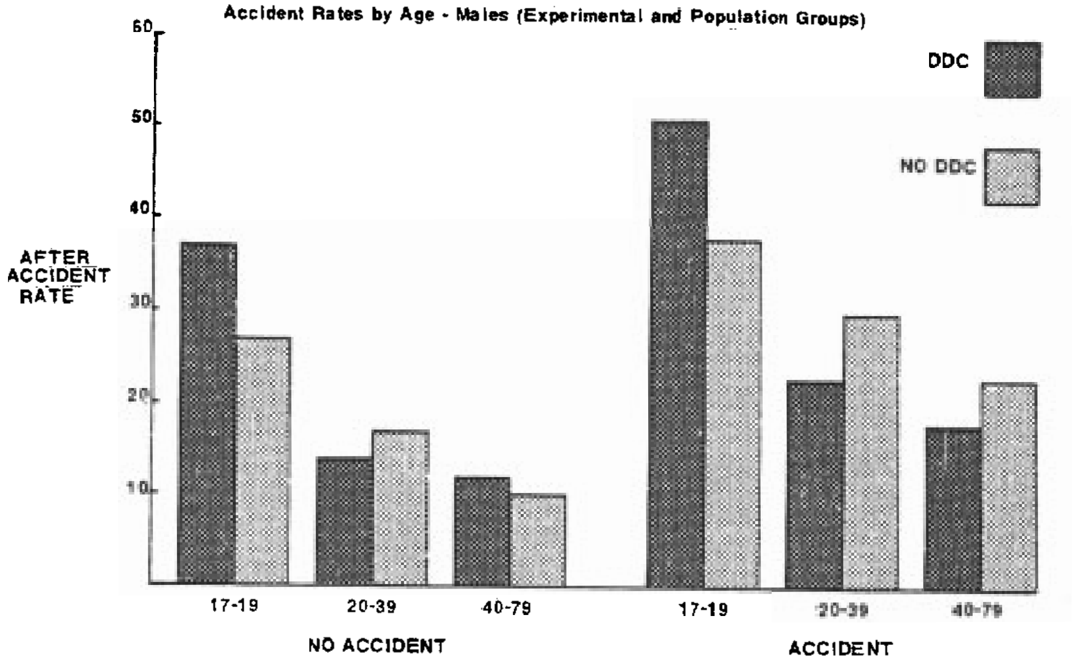


FIGURE 7

Accident Rates by Age - Females (Experimental and Population Groups)

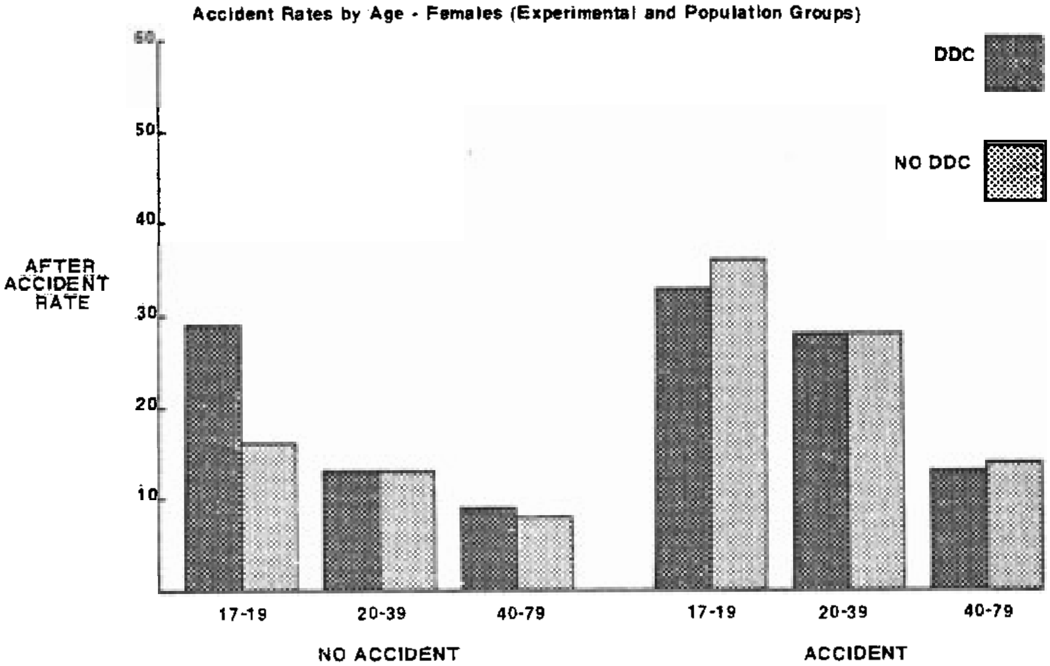


TABLE 10

ACCIDENT RATES BY AGE - MALES

(Experimental and Population Groups)

Before Accident Record	Age	Treatment	After Accident Record		Percentage with Accidents	Chi-squared
			No Accident	Accident		
No accident	17-19	DDC	69	41	37	2.7*
		No DDC	79	29	27	
	20-39	DDC	454	75	14	1.8
		No DDC	524	108	17	
	40-79	DDC	406	54	12	0.6
		No DDC	807	93	10	
Accident	17-19	DDC	33	34	51	2.0
		No DDC	40	25	38	
	20-39	DDC	144	43	23	2.5
		No DDC	142	61	30	
	40-79	DDC	71	16	18	0.7
		No DDC	85	26	23	

*Significant at the .10 level.

TABLE 11

ACCIDENT RATES BY AGE - FEMALES

(Experimental and Population Groups)

Before Accident Record	Age	Treatment	After Accident Record: No Accident	After Accident Record: Accident	Percentage with Accidents	Chi-squared
No accident	17-19	DDC	60	24	29	3.7*
		No DDC	64	12	16	
	20-39	DDC	195	30	13	0.0
		No DDC	544	99	13	
	40-79	DDC	169	16	9	0.1
		No DDC	560	49	8	
Accident	17-19	DDC	16	8	33	0.0
		No DDC	23	13	36	
	20-39	DDC	51	20	28	0.0
		No DDC	116	44	28	
	40-79	DDC	33	5	13	0.1
		No DDC	43	7	14	

*Significant at the .10 level.

However, these differences can be regarded as indicative of overall differences between the two groups. In some cross-classifications, especially for females, the numbers are too small to compare the relevant accident rates.

For 17-19 year olds the cross-classification by driving exposure has little effect on the results. The possibility that differences in driving exposure between the two groups has masked the effectiveness of DDC has no support in this age group.

For the 40-79 year age group the cross-classification by driving exposure may be confounded by the fact that only part of the age group is in the workforce.

The results for the 20-39 age group cross-classified by driving exposure are given in Figure 8 and Table 12. For 20-39 year old males with before accidents who drive as part of work there is a significant difference, at the .05 level, favouring DDC attendees. The accident rates are 14 per cent for DDC attendees and 19 per cent for the population group. For those who do not drive as part of work there is no difference in accident rates.

For 20-39 year old males with before accidents who drive as part of work there is a difference in accident rates favouring DDC attendees (24 per cent compared with 33 per cent). Although this result is not statistically significant it is indicative that the DDC course may be effective for those attendees who drive as part of their work.

The numbers of 20-39 year old women driving as part of work are too small to compare accident rates using this driving exposure variable. For the older age group the analysis by driving exposure does not shed any further light on the analysis.

FIGURE 8
ACCIDENT RATES BY DRIVING AS PART OF WORK MALES 20–39 YEARS
(EXPERIMENTAL AND POPULATION GROUPS)

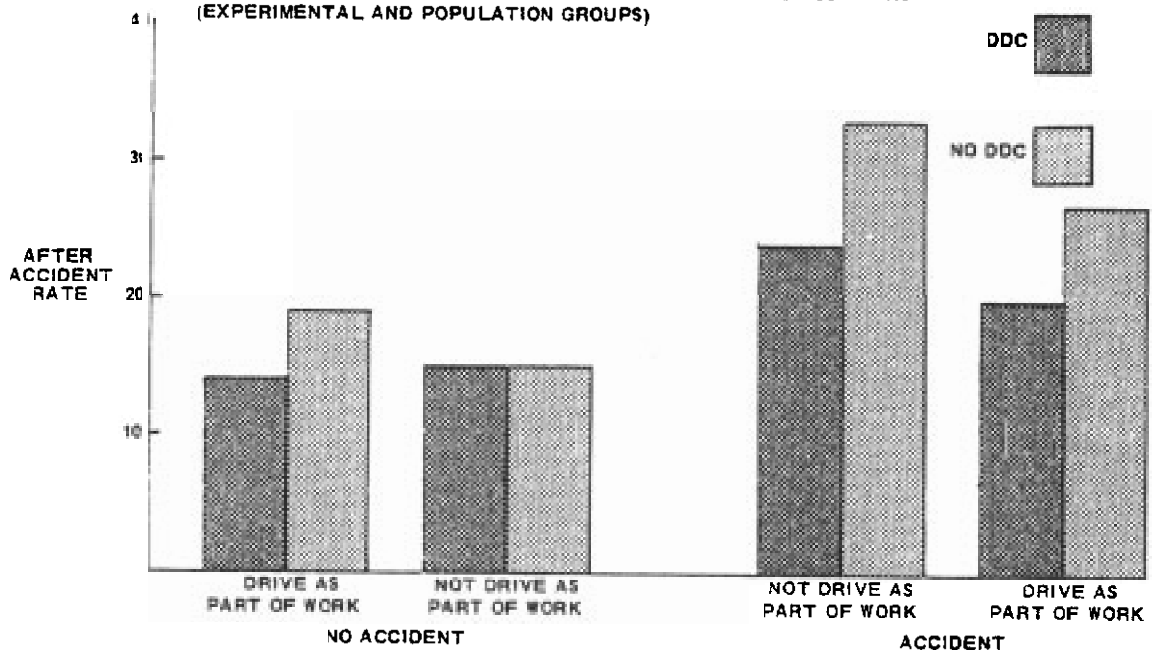


TABLE 12

ACCIDENT RATES BY DRIVING AS PART OF WORK - MALES 20-39 YEARS

(Experimental and Population Groups)

Before Accident Record	Driving as part of work	Treatment	After Accident Record: No Accident	After Accident Record: Accident	Percentage with Accidents	Chi-squared
No Accident	Yes	DDC	335	53	14	4.0**
		No DDC	265	63	19	
	No	DDC	116	21	15	0.0
		No DDC	255	45	15	
Accident	Yes	DDC	110	35	24	2.1
		No DDC	66	32	33	
	No	DDC	31	8	20	0.6
		No DDC	76	28	27	

**Significant at the .05 level.

ANALYSIS OF "SEVERE" ACCIDENTS

The analysis in the previous sections used a very broad definition of an accident and did not consider the costs of the accidents or the injuries involved. In this section the analyses of the previous sections are repeated using a more severe definition of an accident event. This definition includes accidents where the damage costs exceed $300 or there is a personal injury involved.

A major problem with accident research is that accidents are a relatively rare occurrence so that the numbers of respondents reporting accidents is small. This is particularly so in respect of severe accidents. The results are given in Table 13. A brief examination of this table shows a small number of respondents reporting severe accidents.

TABLE 13

COMPARISON OF SEVERE ACCIDENT RATES: EXPERIMENTAL AND POPULATION GROUPS

Before Accident Record	Treatment	After Accident Record: No Severe Accident	After Accident Record: Severe Accident	Percentage with Accident	Chi-squared
No Severe Accident	DDC	1,803	91	5	0.8
	No DDC	3,362	150	4	
Severe Accident	DDC	167	18	10	0.2
	No DDC	173	22	11	

The results show for those respondents <u>with no before accidents</u> 5 per cent of DDC attendees compared with 4 per cent of non-DDC attendees have "severe" accidents. For drivers <u>with before accidents</u> 10 per cent of DDC attendees compared with 11 per cent of non-DDC attendees have "severe" accidents. Neither result is statistically significant.

The results are cross-classified by age and sex in Tables 14 and 15 and presented in Figures 9 and 10. For 17-19 year old males <u>with no before accidents</u> the accident rates are 18 per cent for DDC attendees compared with 12 per cent for the population group. Although this result is not significant, it confirms the results of the previous analyses using a broader accident definition. The results also favour DDC attendees for males in the other two age groups <u>with no before accidents</u> although they are once again not significant.

For 17-19 year old males <u>with before accidents</u> the differences in accident rates are 21 per cent for DDC attendees compared with 9 per cent for the population group. Again this result is not significant but is in line with previous analyses. For 20-39 year old males <u>with before accidents</u> the accident rates are 7 per cent for DDC attendees compared with 13 per cent for the population group. Again these results are not significant but tend to support previous analyses of the effectiveness of the DDC course within this age group. There are no differences in accident rates for the 40-79 year age group.

For female respondents <u>with no before accident</u>, there is a very small difference in an unfavourable direction for the 17-19 year olds and no differences for the other two age groups. For females <u>with before accident</u>, there is a large difference in accident rates for 17-19 year olds but the numbers in the relevant categories are very small. There are no differences for the other two age groups.

FIGURE 9
'SEVERE' ACCIDENT RATES BY AGE
(EXPERIMENTAL AND POPULATION GROUPS) - MALES ONLY

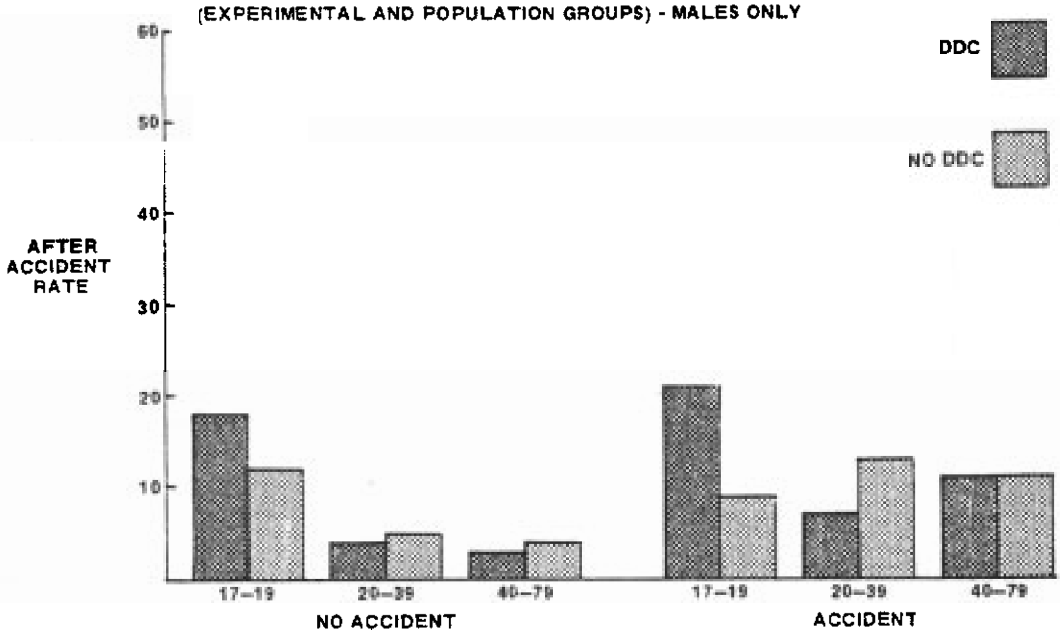


FIGURE 10
'SEVERE' ACCIDENT RATES BY AGE
(EXPERIMENTAL AND POPULATION GROUPS) – FEMALES ONLY

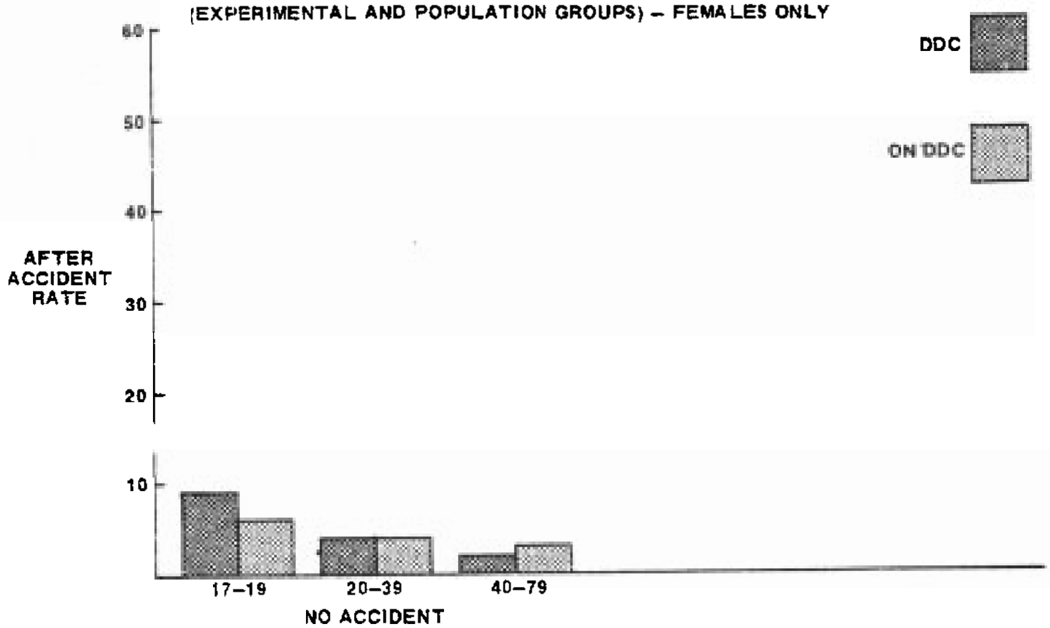


TABLE 14

SEVERE ACCIDENTS BY AGE - MALES

(EXPERIMENTAL AND POPULATION GROUPS)

Before Accident Record	Age	Treatment	After Accident Record: No Severe Accident	After Accident Record: Severe Accident	Percentage with Accidents	Chi-squared
No Severe Accident	17-19	DDC	117	26	18	2.2
		No DDC	132	18	12	
	20-39	DDC	615	25	4	1.6
		No DDC	726	41	5	
	40-79	DDC	505	14	3	1.2
		No DDC	938	37	4	
Severe Accident	17-19	DDC	27	7	21	1.5
		No DDC	21	2	9	
	20-39	DDC	71	5	7	1.8
		No DDC	59	9	13	
	40-79	DDC	25	3	11	0.0
		No DDC	32	4	11	

TABLE 15

SEVERE ACCIDENTS BY AGE - FEMALES

(Experimental and Population Groups)

Before Accident Record	Age	Treatment	After Accident Record: No Severe Accident	After Accident Record: Severe Accident	Percentage with Accidents	Chi-squared
No Severe Accident	17-19	DDC	90	9	9	0.7
		No DDC	96	6	6	
	20-39	DDC	262	11	4	0.1
		No DDC	827	31	4	
	40-79	DDC	203	5	2	0.0
		No DDC	629	17	3	
Severe Accident	17-19	DDC	9	0	0	3.2*
		No DDC	7	3	30	
	20-39	DDC	20	3	13	0.3
		No DDC	41	4	9	
	40-79	DDC	15	0	0	0.0
		No DDC	13	0	0	

*Significant at the .10 level.

Additional analysis, using only accidents involving personal injuries, did not shed further light on the investigation due to the even smaller numbers of respondents in this category.

In summary, due to small numbers of respondents having severe accidents, there are no significant differences in accident rates between the experimental and population groups. However, the results support the previous analyses showing differential effectiveness of the DDC course across age groups.

EXPERIMENTAL AND COMPARISON GROUPS

A major aspect of the research design for the Planek _et al_. (1972) study was a comparison of the _after_ accident record of the experimental group and the _before_ accident record of the "comparison" group. This comparison group attended the DDC twelve months after the experimental group. In a previous chapter these two groups were compared on a number of key variables and significant differences were found between the two groups on sex, age and driving exposure.

The analysis of the accident rates cross-classified by sex and age for the two groups are given in Table 16. There are significant differences in the accident rates for male 20-39 year olds (16 per cent compared with 30 per cent) and females in this age group (17 per cent compared with 29 per cent). These results support the results for the effectiveness of the DDC course within this age group. The results for the 40-79 year olds show significant differences for the females (9 per cent compared with 16 per cent). For males the results favour DDC attendees but are not significant.

For the 17-19 year olds there are no significant differences between the two groups. These results provide no evidence for the

TABLE 16

ACCIDENTS BY SEX AND AGE

(Experimental and Comparison Groups)

Sex	Age	Treatment	After Accident Record: No Accident	After Accident Record: Accident	Percentage with Accidents	Chi-squared
Males	17-19	DDC	102	75	42	0.8
		No DDC	168	104	38	
	20-39	DDC	598	118	16	30.6***
		No DDC	342	146	30	
	40-79	DDC	477	70	13	3.3*
		No DDC	289	60	17	
Females	17-19	DDC	76	32	30	0.0
		No DDC	92	40	30	
	20-39	DDC	246	50	17	13.7***
		No DDC	243	101	29	
	40-79	DDC	202	21	9	4.6**
		No DDC	197	38	16	

*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .005 level.

effectiveness of the DDC course in this age group and hence support previous analyses of the results for this age group.

These analyses of accident rates between the experimental and comparison group should be interpreted with caution. A key variable in the analysis of accident rates for the experimental and population group was the before accident record. This before accident record serves as a measure of "accident proneness". However for these analyses the before accident record is used as the criterion variable for the comparison group so it is not possible to account for differences in "accident proneness" between the two groups.

SUMMARY

For the 17-19 year age group the results show significantly higher accident rates in the after period for DDC attendees compared with the population group. This result holds for both males and females and persists when the results are analysed by driving exposure. For a more "severe" definition of an accident event the results for this age group do not show a statistically significant difference in accident rates but the direction of the differences is again not in favour of DDC attendees.

These results provide no support that DDC is effective for reducing accident rates within this age group. If there was a small difference in accident rates within this age group, a Type II error could be made - the programme could be regarded as ineffective when in fact it is effective. However, in this case the results show significant differences in accident rates in the wrong direction.

The DDC course was designed by the National Safety Council as a driver improvement program so it is not surprising that the course is found to be ineffective for this age group. The current use of the DDC course in this age group could be retarding the development of driver education programs that would be more appropriate for inexperienced drivers. An examination of the needs of these drivers is required for the development of appropriate programs. The results of the De Kalb project in the United States provide some sobering thoughts on the possibility of designing effective driver education programs for young drivers.

For females aged 20-39 and the 40-79 age group for both sexes there is no evidence that the DDC course is effective.

For the male 20-39 year age group the results show consistently lower accident rates in the after period for the DDC attendees compared with the population groups. Analysing the data by driving exposure shows that the DDC appears to be more effective in reducing accidents for those attendees who drive as part of their work. When the data are analysed using a more "severe" definition of an accident event the accident rates are not significantly lower but are indicative of the effectiveness of DDC within this age group. These results are supported when the after records of the experimental group are compared with the before records of the comparison group who attend DDC twelve months after the experimental group.

BENEFIT-COST ANALYSIS

The basic aim of any benefit-cost analysis of a government program is to calculate if the benefits of a program outweigh its costs. This chapter considers the costs of the program as provided by the administrators of the program and the benefits of the program in terms of the reduction in the costs of accidents.

COSTS OF THE PROGRAM

The costs of the program, as provided by the Queensland Road Safety Council, for the financial years 1979/1980 and 1980/1981 are given in Table 17. In Table 18 the estimated costs for the study period (November 1979-October 1980) have been determined by weighing the total costs for 1979/1980 by two-thirds and the total costs for 1980/1981 by one-third. The estimated total costs for the study period were $163,965, the number of attendees for this period was 4,311 (see Figure 3), giving a mean cost per attendee of $38.

The $38 is the cost of the program to the Queensland Road Safety Council. Each course attendee paid the Queensland Road Safety Council $8 to participate in the course. This $8 could be deducted to give a lower mean cost to the Queensland Road Safety Council. However, in benefit-cost analysis we are concerned with the societal costs of the program which must include both the costs to the government and the cost to the individual participant.

Benefit-cost analysis should also value the opportunity cost of the attendee's time in attending the course. If the course is attended in non-working hours the opportunity cost could be taken as zero. However if the course takes place in working hours it is necessary to add the opportunity cost of the attendee's time. Whether

TABLE 17

COSTS OF THE DEFENSIVE DRIVING COURSE

Costs	1979/80 $	1980/81 $
Salaries	46,199	57,159
Equipment, including projectors, motor vehicles	22,449	25,221
Printed materials including workbooks	18,552	14,924
Advertising including letter drops	39,696	54,163
Travelling allowances	20,257	26,572
Other	6,201	5,981
Total costs	153,354	184,020

TABLE 18

MEAN COST OF COURSE ATTENDANCE FOR THE STUDY PERIOD

Total Costs 1979/80	$153,454
Total Costs 1980/81	$184,020
Estimated costs for study period	$163,965
Attendees during study period	4,311
Mean cost per attendee	$38

the opportunity cost of the attendee's time is met by the employer or the employee in loss of wages is irrelevant in benefit-cost analysis.

The costs of the program per attendee are:

(a) cost of the program to the Queensland Road Safety Council ($38)

(b) cost of attending the program ($8)

(c) opportunity cost of the work or leisure foregone.

For the remainder of this analysis the costs of the program will be taken as $38. This is a minimum cost per attendee which excludes the opportunity costs of the work or leisure foregone.

REDUCTION IN ACCIDENT COSTS

The previous chapter considered the question: does the DDC lead to a significant reduction in accidents? This chapter attempts to measure the value of any accident reduction. The total cost of accidents of those who have been through the DDC course is compared with the total cost of accidents for the population group that have not been through the course. In making this comparison the total costs of the latter group are adjusted for differences in the size of each group. The reductions in accident costs attributable to the DDC course is the difference in the total cost of accidents of the two groups. This calculation is made for each of the age and sex groups analysed in the previous chapter.

The results for males are given in Table 19. For 17-19 year old males the unfavourable scenario of the previous chapter is maintained since the total cost of accidents for DDC attendees is

TABLE 19

REDUCTION IN ACCIDENT COSTS ATTRIBUTABLE TO THE DDC COURSE - MALES

Before Accident Record	Age	Treatment	Number of Drivers	Accident Cost $	Reduction in Accident Costs $
No accident	17-19	DDC	110	25,928	-12,948
		No DDC	108	12,980	
	20-39	DDC	529	31,211	2,116
		No DDC	632	33,327	
	40-79	DDC	460	11,040	4,140
		No DDC	900	15,180	
Accident	17-19	DDC	67	24,455	-8,576
		No DDC	65	15,879	
	20-39	DDC	187	16,269	15,334
		No DDC	203	31,603	
	40-79	DDC	87	3,045	3,741
		No DDC	111	6,786	

greater than the total cost of accidents for the population group (adjusted for study size). This result gives a negative reduction in accident costs for this age group and applies irrespective of previous accident record.

For males in the 20-39 and 40-79 age group with no before accident the reduction in accident costs that can be attributed to the DDC course is positive but small in magnitude.

For 20-39 year old males with before accidents there is a relatively large accident reduction of $15,334. The 40-79 year age group for males with before accidents shows a positive accident reduction of $3,741.

The reduction in accident costs attributable to the DDC costs is given for females in Table 20. For females in the 17-19 year age group with no before accidents the reduction in accident costs attributable to the DDC course is -$12,852. For the 20-39 age group with no before accidents the reduction in accident costs is $1,290 and for the 40-79 age group -$1,665.

For females in the 17-19 year age group with before accidents there is a relatively large reduction in accident costs of $4,992. In the analysis of the previous chapter there was no significant reduction in the numbers of accidents for this group that could be attributed to the DDC course. These conflicting findings are due to the small numbers in this age group and a few expensive accidents in the population group. For females with before accidents in the 20-39 year age group the reduction in accident costs is negative and for the 40-79 age group positive but small in magnitude.

As in previous analyses the males in the 20-39 age group are analysed by driving exposure in Table 21. The positive reduction

TABLE 20

REDUCTION IN ACCIDENT COSTS ATTRIBUTABLE TO THE DDC COURSE - FEMALES

Before Accident Record	Age	Treatment	Number of Drivers	Accident Cost $	Reduction in Accident Costs $
No accident	17-19	DDC	84	14,784	-12,852
		No DDC	76	1,932	
	20-39	DDC	225	12,650	1,290
		No DDC	743	13,950	
	40-79	DDC	185	6,845	-1,665
		No DDC	609	5,180	
Accident	17-19	DDC	24	792	4,992
		No DDC	36	5,784	
	20-39	DDC	71	7,668	-3,621
		No DDC	160	4,047	
	40-79	DDC	38	114	76
		No DDC	50	190	

TABLE 21

REDUCTION IN ACCIDENT COSTS ATTRIBUTABLE TO THE DDC COURSE

MALES 20-39 YEARS

Before Accident Record	Driving as part of work	Treatment	Number of drivers	Accident Cost $	Reduction in Accident
	No	DDC	137	6,850	274
		No DDC	300	7,124	
Accident	Yes	DDC	145	12,905	17,545
		No DDC	98	30,450	
	No	DDC	39	3,432	1,482
		No DDC	104	4,914	

in accident costs for this age group holds irrespective of driving exposure. However, the magnitude of the reduction in accident costs is greater for those who drive as part of their work, especially if they have had a previous accident.

BENEFIT-COST ANALYSIS OF THE DDC COURSE

The question: is the program worthwhile? can be answered in terms of a comparison of the reduction in accident costs attributable to the DDC course and the costs of attendance at the DDC course. The minimum cost of attendance at the course is $38 while the accident reduction attributable to the program varies according to sex, age and driving exposure. In Tables 22, 23 and 24 the net benefit of the DDC course is calculated by subtracting the costs of attending the DDC course from the reduction in accident costs. In summary:

Net Benefit = Reduction in accident costs

less Costs of attending the course.

The results for males in Table 22 show a negative net benefit of the DDC course for all age groups where there has been no accident in the before period. This negative net benefit also holds for the 17-19 year age group who have had an accident in the before period. For males in the 20-39 age group there is a positive net benefit. This will be analysed further by driving exposure in Table 24. There is a positive but small net benefit for the males aged 40-79.

Table 23 gives the net benefit of the DDC course for females. This shows negative net benefits for all groups except those aged 17-19 with accidents in the before period. Given the small numbers in this group this finding is noted as favourable to the DDC course but of restricted value for policy recommendations.

TABLE 22

NET BENEFITS OF THE DDC COURSE - MALES

Before Accident Record	Age	Treatment	Number of Drivers	Reduction in Accident Costs $	Costs of Attending Course $	Net Benefit $
No accident	17-19	DDC	110	-12,948	4,180	-17,128
		No DDC	108			
	20-39	DDC	529	2,116	20,102	-17,986
		No DDC	632			
	40-79	DDC	460	4,140	17,480	-13,340
		No DDC	900			
Accident	17-19	DDC	67	-8,576	2,546	-11,122
		No DDC	65			
	20-39	DDC	187	15,334	7,106	8,228
		No DDC	203			
	40-79	DDC	87	3,741	3,306	435
		No DDC	111			

TABLE 23

NET BENEFITS OF THE DDC COURSE - FEMALES

Before Accident Record	Age	Treatment	Number of Drivers	Reduction in Accident Costs $	Costs of Attending Course $	Net Benefit $
No accident	17-19	DDC	84	-12,852	3,192	-16,044
		No DDC	76			
	20-39	DDC	225	1,290	8,550	-7,260
		No DDC	743			
	40-79	DDC	185	-1,665	7,030	-8,695
		No DDC	609			
Accident	17-19	DDC	24	4,992	912	4,080
		No DDC	36			
	20-39	DDC	71	-3,621	2,698	-6,319
		No DDC	160			
	40-79	DDC	38	76	1,444	-1,368
		No DDC	50			

TABLE 24

NET BENEFITS OF THE DDC COURSE - MALES 20-39 YEARS

Before Accident Record	Driving as part of Work	Treatment	Number of Drivers	Reduction in Accident Costs $	Costs of Attending Course $	Net "Benefit" $
No accident	Yes	DDC	388	3,880	14,744	-10,864
		No DDC	328			
	No	DDC	137	274	5,206	-4,932
		No DDC	300			
Accident	Yes	DDC	145	17,545	5,510	12,035
		No DDC	98			
	No	DDC	39	1,482	1,482	0
		No DDC	104			

In Table 24 the males aged 20-39 which showed a positive net benefit are considered by driving exposure. This shows negative net benefits for those with no before accident and a zero benefit for those with before accidents who do not drive as part of their work.

The only group to retain a positive net benefit from this analysis are the males aged 20-39 with accidents in the before period who drive as part of their work. If the full costs of attending the program were taken into account by calculating the opportunity costs of work foregone this positive net benefit would be reduced in magnitude.

CONCLUSIONS

The evaluation of the Defensive Driving Course, as implemented in the State of Queensland, concludes that:

1. The DDC course is not effective in reducing accidents for 17-19 year olds and may be potentially harmful for this group. This finding may not apply to females with a previous accident record.

2. The DDC course is not effective in reducing accidents for female drivers 20 years of age and above.

3. The DDC course may be effective in reducing accidents for male drivers aged 20-39 years who drive as part of their work. However a benefit-cost analysis of this group shows the reduction in accident costs attributable to the DDC course exceeds the costs of attendance only for those drivers with an accident in the before period.

The unavoidable recommendation from this evaluation is that there is no justification for implementing the program in other Australian states and no economic justification for continuing the program in Queensland except perhaps for a selected group who drive as part of their work and have had previous accidents.

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