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PILOT STUDY OF PROMOTION OF PUBLIC BREATH TESTING

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Abstract:

This pilot study evaluated the effectiveness of various promotional activities in attempting to achieve a 10% or greater usage rate of public breath test machines by drivers with a BAC over .05 in licensed premises in Melbourne. The two levels of promotional activity undertaken were placement of posters and coasters in venues (Level A) and posters and coasters plus an inhouse promotional event and local media coverage (Level B). The cost (to the driver) of testing was 20 cents, $1 or $2.

The results of the study suggest that reducing the cost of testing to 20 cents would be a more effective way of increasing the number of drivers with BAC>.05 who test themselves, rather than committing resources to promotion. The greatest benefit cost ratios are obtained by using twenty cent machines: the estimated BCR for installing 300 twenty cent machines in the 150 highest volume liquor establishments is 1.41 if the net machine cost per month is $120. All other combinations of cost of testing and net machine cost per month lead to BCRs which are not statistically greater than 1.00. In addition, there may be some smaller volume establishments with higher than average usage rates for which installation of twenty cent machines might result in a BCR significantly greater than one.

To maximise the number of tests and thus the benefits in terms of road safety and commercial viability, there is a need to carefully target particular types of venues and locations for installation of BTMs.

Key Words:
(IRRD except when marked*)
Breath test, breathalyser, cost benefit analysis, printed publicity, public relations, road user education

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EXECUTIVE SUMMARY

This pilot study evaluated the effectiveness of various promotional activities in attempting to achieve a 10% or greater usage rate of public breath test machines by drivers with a BAC over .05 in licensed premises in Melbourne. This information is needed to decide whether to commit substantial resources to promote the wider use of these machines.

The two levels of promotional activity undertaken were placement of posters and coasters in venues (Level A) and posters and coasters plus an inhouse promotional event and local media coverage (Level B). The cost (to the driver) of testing was 20 cents, $1 or $2.

The usage rates and benefit-cost ratios were calculated for use by drivers only, rather than all patrons. The interview data showed that fewer than 50% of patrons (and users) were drivers. This reduced the usage rates and benefit-cost ratios markedly.

Objective 1: To determine whether any promotional activity or combination of activities will result in 10% or more of drivers with BACs>.05 (the target group) using breath testing machines (BTMs).

When all the experimental venues were included, the mean usage rate was significantly **less than** 10% both before and after promotions. The overall usage rate is dependent upon the number of machines at each cost of testing, however.

When analysed according to cost of testing, **usage rates after Level A promotions (but not before) were significantly higher than 10% for venues with 20c machines**. Usage rates were **not** significantly larger than 10% before or after promotion, for the $1 or $2 machines. While these analyses had sufficient statistical power, the results should be viewed with caution because it is based on very small numbers of venues and there was considerable variability between venues. If another sample of venues were chosen, the results may have been somewhat different.

Objective 2: To compare the relative effectiveness of different promotional activities in achieving increased usage rates for the target group.

Both levels of promotion were found to produce statistically significant increases in usage rates from the pre-promotion level.

However, analysis showed that **the mean number of tests with BAC>.05 did not increase with promotion when controlled for external influences**. The results suggest that the observed increases in usage rates resulted from a reduction in the size of the target group (the denominator of usage rate), rather than an increase in the number of tests by members of the target group (the numerator). The reduction in the size of the target group which was observed may have resulted from concurrent increases in drink driving publicity and enforcement.

Objective 3: To assess the commercial viability of breath test machines charging 20 cents, $1 or $2.

While usage rates of greater than 10% by the target group were achieved for 20 cent machines, the absolute number of tests, and thus revenue was not great. The costs at which machines would be financially viable, at each cost of testing, are presented in the report.

The results of the study suggest that reducing the cost of testing to 20 cents would be a more effective way of increasing the number of drivers with BAC>.05 who test themselves, rather than committing resources to promotion. The greatest benefit cost ratios are obtained by using twenty cent machines: the estimated BCR for installing 300 twenty cent machines in the 150 highest volume liquor establishments is 1.41 if the net machine cost per month is $120. All other combinations of cost of testing and net machine cost per month lead to BCRs which are not statistically greater than 1.00. In addition, there may be some smaller volume establishments with higher than average usage rates for which installation of twenty cent machines might result in a BCR significantly greater than one.

To maximise the number of tests and thus the benefits in terms of road safety and commercial viability, there is a need to carefully target particular types of venues and locations for installation of BTMs. Venues varied in the number of tests, the proportion of drivers who had BAC>.05 and usage rates. Size of the venue clearly constrains the number of tests, but other factors also play a role. Lower usage rates (not numbers of tests) at some larger venues suggest that perhaps more than one machine could be placed there. Placement of the machine in the venue can influence the number of tests: machines placed where people are drinking most (or most people are drinking) are likely to be used more frequently than those placed in, for example, gaming rooms where little alcohol is consumed. A larger proportion of drivers have BAC>.05 at some venues than others. Identification and targeting of these venues would assist in maximising the usage rates and road safety benefits of BTMs.

TABLE OF CONTENTS

Page

1. INTRODUCTION

1.1 BACKGROUND

Drink-driving is a major road safety issue at which considerable enforcement, publicity and education efforts have been directed. Yet many drivers continue to be unsure of whether their Blood Alcohol Concentration (BAC) is under the legal limit or not. If drivers could more accurately estimate their BAC, they would have better information to decide on how much to drink and whether or not to drive after drinking. Coin-operated breath testing equipment in licensed premises provides a useful source of this information.

Recent MUARC research (Haworth and Bowland, 1995) estimated the benefit-cost ratios (BCRs) needed to decide whether coin-operated breath testing should be promoted as a road safety initiative and to what extent. This project found that 16% of drivers who intended driving home changed their mind after finding out that their BAC was greater than .05. In addition, at least the same number of additional drivers decided not to drink any more before driving. BCRs were calculated which included the benefits of both these changes in behaviour. A range of promotional expenditures and assumptions of the proportions of potential drivers with illegal BAC who would test themselves were used in these BCR calculations.

Using the social cost of urban crashes (Corben, Newstead, Cameron, Diamantopoulou and Ryan, 1994), a BCR of 5.8 was estimated if

- machines were installed in the top 150 licensed premises in Melbourne with the highest alcohol sales
- $500 per machine per annum was spent on promotion, and
- 10% of intending drivers over .05 tested themselves.

The results of this study (Haworth and Bowland, 1995) indicated that usage rates were low, below 10%. The pilot study reported here was conducted to evaluate the effectiveness of various promotional activities in attempting to achieve a 10 percent or greater usage rate of public breath test machines by drivers over .05 in licensed premises in Melbourne. This information is needed prior to deciding whether to commit substantial resources to promote the wider use of these machines.

1.2 PROJECT OBJECTIVES

The specific objectives of the project were to determine:

1. whether any promotional activity or combination of activities will result in 10% or more of drivers with a BAC over 0.05 (the target group) using public breath test machines

2. the relative effectiveness of different promotional activities or combinations of activities in achieving increased usage rates for this target group

3. the commercial viability of breath test machines charging 20 cents, $1 or $2

The objectives of the study can be restated as the following research questions:

Objective 1: Is the usage rate after promotion greater than or equal to 10%?

Objective 2: Does the increase in usage rate from before promotion to after promotion differ according to the type of promotional activities (or combination of activities) undertaken?

Objective 3: To what extent is revenue after promotion greater than costs for any or all of 20c, $1 or $2 machines?

These specific objectives were formulated to provide information needed to assess the viability f public breath test machines as a drink driving countermeasure.

1.3 STRUCTURE OF THIS REPORT

The design and method employed in the Pilot Study are described in Chapters 2 and 3, respectively. The results and the statistical analyses are presented in Chapter 4. The reader may proceed to the summary of the results presented at the beginning of Chapter 4 if they wish. Chapter 5 discusses the results and presents the conclusions of the Pilot Study.

2. DESIGN

The project design was developed to effectively address all three specific objectives within the time constraints outlined in the project brief.

2.1 MEASURING USAGE RATE

The measurement of usage rate is critical to achieving the first two objectives of the project. Usage rate incorporates information about not only how many tests are conducted but also BAC level and driving status of both testers and non-testers. It is defined in terms of intending drivers at the venue as,

$$\textit{usage rate} = \frac{\textit{number of intending drivers with BAC>.05 who test themselves}}{\textit{number of intending drivers with BAC>.05}} \times 100$$

For the purpose of this study, the breath testing machines (BTMs) were modified to collect date, time, venue and BAC level. Thus, data on the number of tests over .05 was available. However, this number is not directly related to the usage rate as non-drivers may test and drivers (or non-drivers) may test themselves more than once. Calculating the usage rate requires information on how many intending drivers with BAC>.05 there are at the venue and how many of these intending drivers test themselves.

Approaching users and non-users of the BTMs to ask whether they were intending drivers continuously throughout the pilot study would be expensive and would interfere with the normal usage of the machines. Instead, the procedure below was adopted:

- measure the number of patrons who intend to drive and have BACs>.05 before and after promotion occurs,
- divide this by the total number of patrons at the venue to calculate the proportion of patrons at the venue who intend to drive and have BACs>.05 (before and after promotion occurs)
- count (or estimate) the number of patrons before and after promotion,
- measure the number of tests with BAC>.05 both before and after promotion,
- combine the number of tests, number of patrons and proportion of patrons to estimate usage rates as

usage rate before promotion (BP)

$$= \frac{\textit{no. of tests with BAC>.05 (BP) x proportion of testers who were drivers}}{\textit{no. of patrons (BP) x proportion of patrons who intend to drive and have BAC>.05 (BP)}} \textit{ x 100}$$

usage rate after promotion (AP)

$$= \frac{\textit{no. of tests with BAC>.05 (AP) x proportion of testers who were drivers}}{\textit{no. of patrons (AP) x proportion of patrons who intend to drive and have BAC>.05 (AP)}} \textit{ x 100}$$

The proportion of testers who were drivers was estimated as the proportion of all drinkers interviewed who said that they intended to drive home. Reanalysis of data from our earlier study (Haworth and Bowland, 1995) showed that drivers and non-drivers were equally likely to self-test. Therefore multiplying the number of tests by the proportion of testers who were drivers would give a satisfactory estimate of the number of tests by drivers.

2.2 MEASURING COMMERCIAL VIABILITY

The third aim, estimating the commercial viability of breath test machines (BTMs) which charge 20c, $1 and $2, does not require the measurement of usage rate. The major factor in the commercial viability of the machines is the extent to which the revenue collected from the coins is greater than that paid by the licensee for the hire and maintenance of the machine. Where,

revenue = (number of tests x cost of testing) - loss due to any theft of coins

2.3 CONTROLLING FOR POSSIBLE EXTERNAL EFFECTS ON USAGE RATES

External factors such as changes in enforcement or advertising levels or seasonal factors have the potential to produce a change in the usage rate from the before promotion to after promotion periods. To control for these factors, machine data were collected from 14 modified machines (the control machines) which were installed in venues that were considered to be unaffected by the promotions. The changes in numbers of tests for these machines provided control data against which to assess the changes in the usage rate of experimental machines due to promotion. There was no interviewing at the control locations, therefore proportions of patrons who were drivers with BAC>.05 and thus, usage rates could not be calculated for control venues.

While the control machines were of each denomination (see Table 2.1), there was no direct matching of individual experimental and control machines.

Later in this report, the 15 experimental venues are labelled EA to EO and the 14 control venues as CA to CN.

Table 2.1. The distribution of machine type and denomination for the experimental and control groups.

	Experimental Group	**Control Group**
20c Alcolizer	3	3
$1 Alcolizer	5	6
$2 Breathometer	7	5*
Total	15	14

* one of these machines was later deleted from the study (see Section 3.2)

2.4 PROMOTIONAL ACTIVITIES

Vic Roads contracted CNG DATA SERVICES to undertake the promotional activities for the Pilot Study. As Table 2.2 shows, each experimental venue was assigned to one of two levels of promotional activity:

- Level A: Passive promotion: display of posters and coasters at the venue
- Level B: Active promotion: posters and coasters plus an inhouse promotional event with local media coverage

Table 2.2. The distribution of machine type and denomination for the three levels of promotional activity.

	Level A	**Level B**
20c Alcolizer	2	1
$1 Alcolizer	3	2
$2 Breathometer	3	4

The posters and coasters were distributed to all Level A and Level B venues during the same week and were all removed nine weeks later. For logistical reasons, the inhouse promotional events occurred on different weeks during the period that the posters and coasters were displayed.

2.5 DATA COLLECTION PERIODS

The readings recorded by the BTMs were divided into four sequential data collection periods:

1. novelty period (for newly installed machines)
2. pre-promotion period
3. promotion Level A
4. promotion Level B

Machine data from the novelty period (the first four weeks after installation of new machines) were not included in the data analyses. These data were likely to be unrepresentative because of the potentially high rates of game playing and larger numbers of tests usually found during this period.

The pre-promotion period for experimental venues ran from the end of the novelty period until the distribution of coasters and posters. This period ranged from 26 days to 55 days, depending on the date of installation of the BTM. The "pre-promotion" period for the control venues was the four weeks immediately prior to the distribution of posters and coasters at the experimental venues.

While each of the objectives require measurement of number of tests or usage rate after promotion, the project timetable limited the research to comparisons of before and during promotion, rather than before and after promotion. For this reason, the after promotion measures were collected after promotion **commenced**, rather than after promotion was **completed**.

The Level A promotion period for experimental venues which received Level A promotion was the period from the distribution of the posters and coasters until their collection (66 days). The Level B experimental venues were considered to undergo Level A promotion from the distribution of the posters and coasters until the onset of Level B promotion. This period ranged from 8 to 64 days. The Level A promotion period for control venues ran from the date of distribution of coasters and posters to experimental venues until the mid-point of the commencement of Level B promotion at the experimental venues (36 days).

The Level B promotion period for experimental venues began on the day of the inhouse promotional event. For most venues, it ran for 63 days but data from venues with later events had to be curtailed after a shorter period to avoid the influence of pre-Christmas drinking (latest data was 5 December). For these venues, the Level B promotion period ranged from 23 to 43 days. The Level B promotion period for control venues ran for 44 days from the end of the Level A period.

3. METHOD

3.1 SELECTION OF VENUES

The Australian Hotels Association provided a list of venues which were potential participants in the study. VicRoads approached these venues to participate as experimental venues by having an Alcolizer or Breathometer BTM installed. A sample of venues with Alcolizer or Breathometer machines currently installed were approached by VicRoads to participate in the study as control venues. There were no 20 cent machines installed in experimental or control venues at the time but machines owned by VicRoads were modified to take 20 cent coins. VicRoads approached venues to have these machines installed at experimental and control venues.

Seventeen of the venues approached by VicRoads were unwilling to participate in the study. A variety of reasons were given, but several managers stated that there was no location appropriate for the size of the BTMs.

When a machine needed to be installed, VicRoads suggested that the public bar area was the preferred position due to more drinking occurring in this area than say, the bistro or gaming area. However, managers sometimes felt it was more convenient to locate the machine elsewhere (for example, next to the cigarette machine in the passageway adjoining the bar).

3.2 MACHINE DATA

All machines were modified by their distributors to store date, time, venue and BAC level data. These data were downloaded and a copy supplied to MUARC on a monthly basis.

There were some instances of machine data being corrupted or unavailable because of power supply interruptions (current fluctuations or the machine being inadvertently turned off), machine malfunctions or vandalism. In fact, the data quality from one control venue with a $2 machine (CN) was so poor that it had to be excluded from the study.

BAC readings of greater than .300 were coded as invalid by MUARC, because it was highly likely that these readings resulted from contamination by mouth alcohol. The true BACs of some of these drinkers would be above .05 (and so they would be part of the target group). However, drinkers receiving messages that their BACs were greater than .300 would be unlikely to believe the messages and so would be unlikely to change their driving intentions. For this reason, the invalid readings were not included in the total number of readings with BAC>.05.

Whenever interviewing occurred at a venue during the data collection period, the machine data for that day were excluded from the data analysis. This was because the presence of interviewers offering free breath tests may have influenced the number of paid tests during that period.

3.3 INTERVIEWING OF PATRONS

3.3.1 Interviewing schedule

Interviews were conducted four times at each experimental venue - once during the week, and once at the weekend, before and after the commencement of the promotional period. The second round of interviews occurred after the completion of Level A and Level B promotions at most venues. At two venues (EK and EM), interviewing took place just before the end of the Level B promotion period.

For the purposes of this study, the weekend period included Thursday through to Sunday as these are days which correspond to increased patronage. Table 3.1 shows the distribution of days on which interviewing occurred for each machine denomination.

Table 3.1. Distribution of interview visits by day of week and machine denomination for each interview period.

	Weekday			**Weekend**			
	Mon	**Tue**	**Wed**	**Thur**	**Fri**	**Sat**	**Sun**
Before promotion:							
20c	-	3	-	-	2	1	-
$1	2	1	2	2	-	-	3
$2	2	2	3	2	1	2	2
Total	**4**	**6**	**5**	**4**	**3**	**3**	**5**
After promotion:							
20c	-	3	-	-	2	1	-
$1*	2	1	1	2	-	-	2
$2	2	2	3	2	1	2	2
Total	**4**	**6**	**4**	**4**	**3**	**3**	**4**

** One venue (EE) refused permission for the post promotion interviewing. No reason was given, but there had been a change in management.*

Interviewing took place during the busiest three hour period before closing time (as advised by management or staff of each venue). The earliest a shift started was 4pm; the latest a shift ended was 1am. Weekday shifts tended to occur at an earlier time than weekend shifts due to extended licensing hours on the weekend.

3.3.2 Interviewing procedure

Interviewers conducted their shift in the room where the BTM was located and only approached patrons in that room. In most cases these were bar patrons, but in those venues where several service areas (e.g. bar, eatery or gaming area) were located in the one room, any patron could be approached as long as they were not eating or playing. If the BTM was located in a passageway, interviewers approached patrons in

the nearest adjoining room. Where possible, *every* patron in the specified room was approached by an interviewer. Each interview took approximately two minutes.

Patrons who agreed to participate in the study were asked whether they intended to drive away from the premises. Intending drivers (including those who stated they were unsure whether they would drive) were then asked:

- if they had consumed any alcohol in the previous 20 minutes. If so, they were provided with a cup of water at room temperature to rinse their mouth
- to provide a BAC reading by breathing into an SD2 hand-held breath tester
- whether they had used the wall-mounted machine that night and how many times, and
- if their reading was above .05, they were asked whether they still intended to drive.

For the post-promotion interviews, drivers were also asked the time they arrived and intended to depart from the venue. If anyone was uncertain about their departure time, interviewers asked whether it might be before or after the time that they completed their shift. For example, if the shift finished at 11pm the interviewer would ask the patron if they were likely to leave before or after 11pm.

A copy of the data recording sheets used in the before and after promotion interviewing can be found in Appendix 1.

Participants with BACs over .05 who were still intending to drive were offered a taxi voucher as an enticement not to break the law or endanger themselves and other road users. During the first interviewing stage vouchers were limited to $50 and 56 vouchers were issued. Some patrons misused the vouchers by driving away from the venue and using the voucher on another night to the full value. During the second interviewing stage, interviewers were instructed to write the date and trip origin on the vouchers before they were issued and the value of each voucher was limited to $20. A total of 16 vouchers were issued during the second interviewing stage.

The first round of weekday interviewing at one venue was repeated because patrons were found to be drinking excessively in order to "qualify" for a taxi voucher. Data from the first round of interviews at this venue was discarded.

The SD2 hand-held breath testers were calibrated and the batteries replaced weekly to maintain an adequate performance level.

3.3.3 Headcount of patrons

Each interviewer took a headcount of patrons on four occasions - on arrival, after the first and second hour, and before leaving. Only patrons present in the room where the BTM was located were included in the count because it was considered unlikely that patrons from other rooms would use the machine. The conversion of headcounts to estimates of the number of different patrons in the room is discussed in Appendix 4.

3.3.4 Interviewers

The interviewers were employees of the Accident Research Centre or associates. Interviewers ranged in age from 21 to 31. They worked in male-male or male-female pairs for security reasons but only one interviewer approached and interviewed each patron.

4. RESULTS

This chapter begins with summaries of the data obtained from interviewing and the numbers of tests. The results relating to the three objectives of the study are then presented. The final section of this chapter examines some possible additional effects of promotion.

4.1 INTERVIEWING

The data from pre-promotion and post-promotion interviewing are summarised in Appendix 2. One venue refused to participate in post-promotion interviewing and so was unable to be included in the data analysis. Excluding this venue, 1308 patrons were approached in the first round of interviews and 1146 were approached in the second round of interviews. The smaller number of patrons approached after promotion may have resulted, at least partly, from each interview being longer because of the inclusion of additional questions about duration of stay. The estimated number of patrons in the venues was not lower during the second round of interviewing than the first.

The overall refusal rates were 11.8% (range 3.2% to 25.0%) for interviewing before promotion and 13.0% (range 2.7% to 51.6%) for interviewing after promotion. Some patrons refused to be interviewed during post-promotion interviewing, stating they had participated in the pre-promotion interviewing.

One of the aims of interviewing was to estimate the extent of repeat testing by the same person on the same evening. Patrons were asked whether they had used the BTM that evening and, if so, how many times. None of the patrons interviewed pre- or post-promotion stated that they had used the machine more than once that evening. This suggests that repeat testing is not a major issue in interpretation of the machine data. However, it must be noted that only drivers were asked this question and it is not known whether repeat testing was more prevalent amongst non-drivers. No correction for repeat testing was applied to the machine data.

The proportion of patrons interviewed who were drivers was 0.44. Statistical analysis showed that this proportion did not differ significantly from pre- to post-promotion interviewing ($F(1,11)=0.36$, $p>.10$) or between denominations ($F(2,11)=0.37$, $p>.10$). There was no significant interaction, either ($F(2,11)=1.11$, $p>.10$). Therefore, in calculating usage rates, the number of machine tests was multiplied by 0.44 for each venue.

4.2 NUMBERS OF TESTS

Machine data on numbers of tests and BAC levels were analysed for experimental and control venues. Machine data was lost for one control venue (CN) because of

vandalism. The number of tests per day at each BAC level are summarised in Appendix 3.

Figure 4.1 shows the mean number of tests per day per venue. All tests are included, regardless of BAC reading (i.e. tests with BAC<.05, >.05 and >.30). The clearest pattern is the reduced number of tests per day as the cost of testing increased.

Figure 4.2 presents the mean number of tests with BAC>.05 (but less than .30) per day per venue. This is the numerator of the usage rate, the denominator being the size of the target group. Figure 4.2 shows that the number of tests with BAC>.05 decreased with increasing cost of testing, the same pattern that was found for all tests in Figure 1. Comparing Figure 4.1 with Figure 4.2 shows that approximately half of all of the tests had BAC>.05.

4.2.1 Statistical analyses of numbers of tests with BAC>.05

Statistical analyses were undertaken to compare the mean number of tests per day with BAC>.05 before and after the promotional activities. The data are summarised in Appendix 3 and the summaries of the statistical analyses are presented in Appendix 6.

The following analyses utilised data for both experimental and control machines. For each machine, the difference between the average number of tests per day with BAC>.05 before and after promotion was computed. A separate calculation was made for promotion Level A and promotion Level B averages. The number of tests with BAC>.05, across all experimental and control venues, increased from pre-promotion to Level A promotion (by 0.14 tests/day) and from pre-promotion to Level B promotion (by 0.70 tests/day).

To determine whether the changes in the average number of tests with BAC>.05 per day were related to the type of venue (ie experimental vs control), machine denomination (ie 20c vs $1 vs $2) or the time of week (weekday vs weekend), an Analysis of Variance (ANOVA) was conducted. These three factors, together with their first order interaction terms were considered in the analyses.

The increase in the average numbers of tests with BAC>.05 from before promotion to Level A promotion was not significantly greater for experimental than control machines. Therefore Level A promotion could not be shown to have significantly increased the average number of tests. The increase did not differ significantly according to machine denomination or time of week (none of the p-values were significant).

The increase in the average number of tests with BAC>.05 after Level B promotion was greater for experimental than control venues ($p=0.039$). However, there was a significant interaction between the type of venue and the machine denomination ($p=0.006$). The nature of this interaction is shown in Figure 4.3 below.

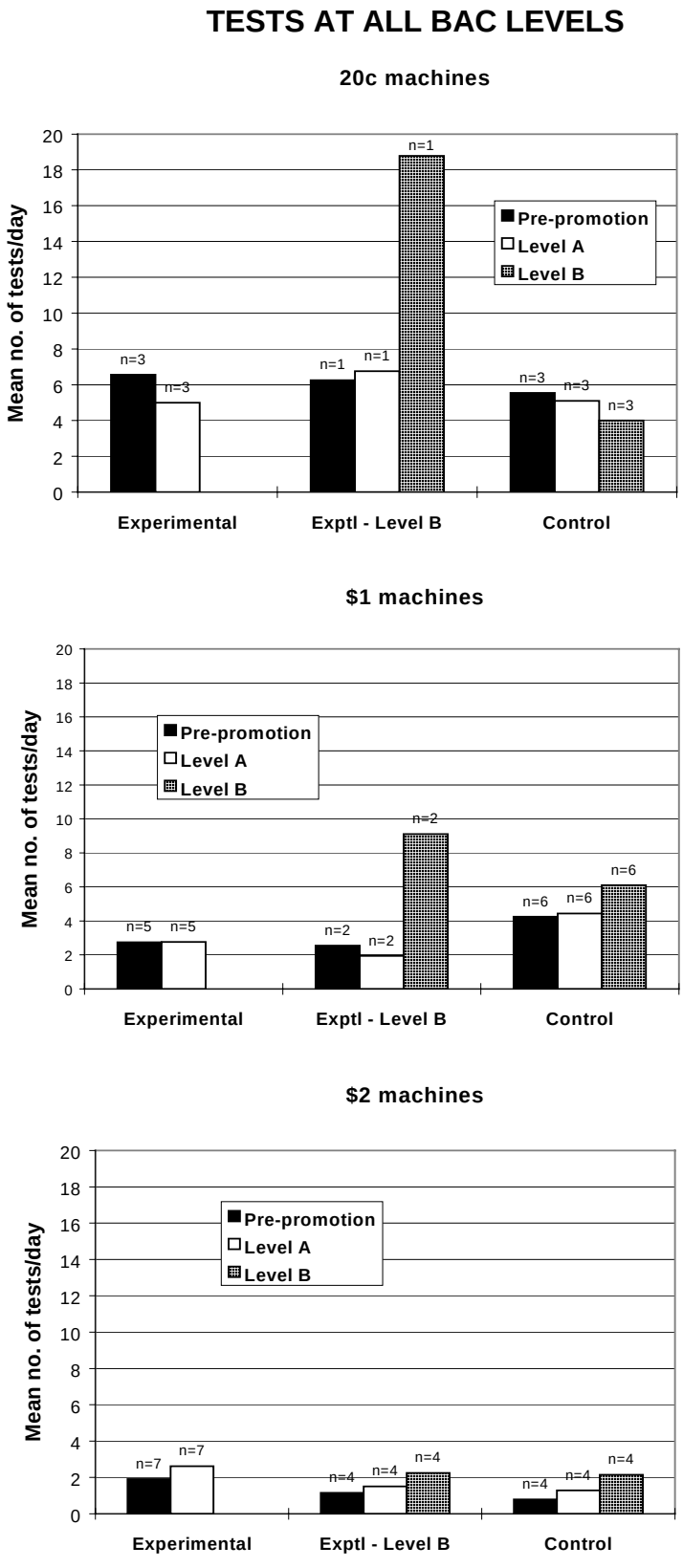

Figure 4.1. Mean number of tests per day per venue.

Experimental includes all experimental venues. Exptl (Level B) includes only experimental venues which had Level B promotion. The number of venues contributing data is indicated by n. All tests, regardless of BAC reading, are included.

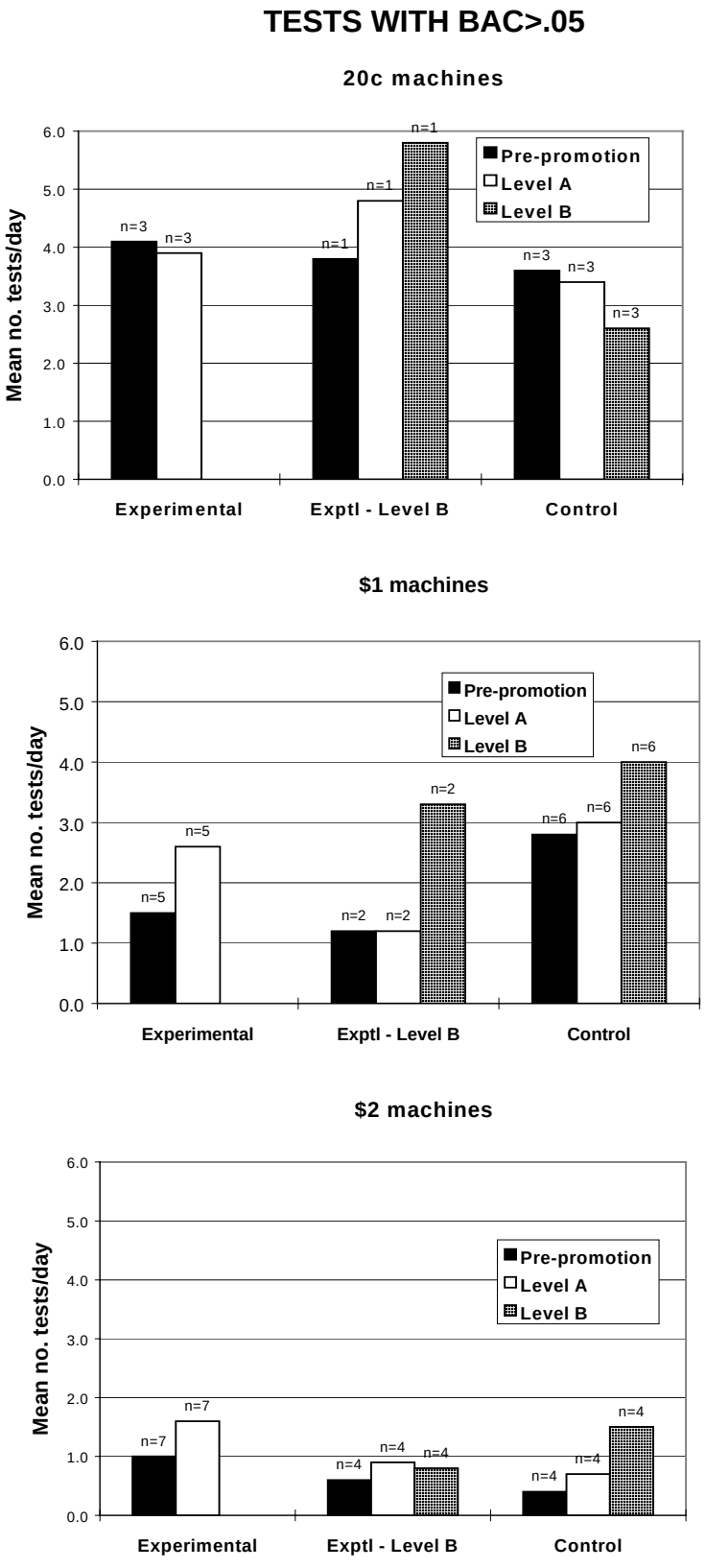

Figure 4.2. Mean number of tests with BAC>.05 per day per venue.
Experimental includes all experimental venues. Exptl (Level B) includes only experimental venues which had Level B promotion. The number of venues contributing data is indicated by n. Tests with readings over .30 were excluded.

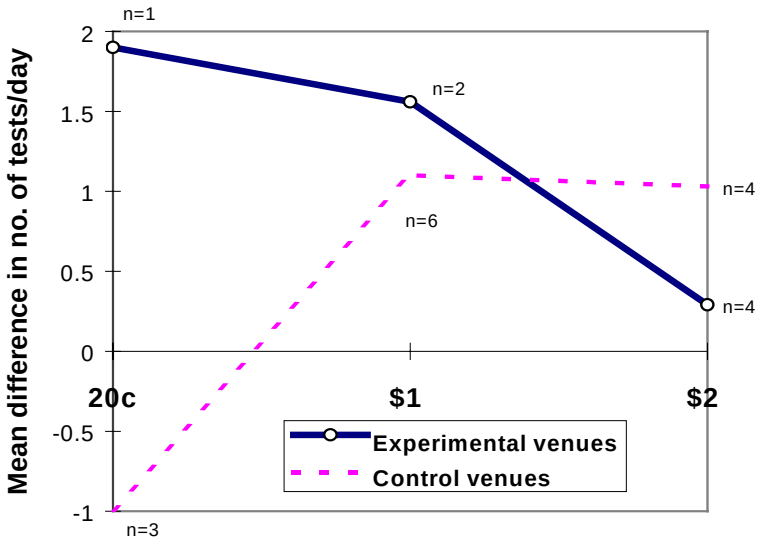

Figure 4.3. Change in mean number of tests with BAC>.05 from pre-promotion to Level B as a function of venue type and machine denomination.

At the experimental venues, the 20c machines had the greatest increase in the average numbers of tests with BAC>.05 from pre-promotion to Level B promotion. Whilst the average numbers of tests with BAC>.05 was also higher during promotion Level B than the before promotion period for both $1 and $2 machines, these were less than that for the 20c machines. Figure 4.3 shows a decreasing effect of promotion with increasing denomination of machine.

At control venues there were more tests during the pre-promotion period than during the Level B promotion period at the venues with 20c machines. The numbers of tests at control venues during the Level B period were greater than pre-promotion values for both $1 and $2 venues.

The analyses of the numbers of tests with *BAC<.05*, while not reported here, gave a similar pattern of results, i.e. the change with promotion did not differ according to venue type, machine denomination or time of week.

4.2.2 Number of tests for 20 cent control machines

Most of the $1 control machines and all of the $2 control machines had been installed as part of the normal commercial relationships between the licensees and distributors. Thus any original novelty effect for these machines would have dissipated long before the commencement of this study. However, the 20 cent control machines were all installed for the purposes of this study. While all of the 20 cent control machines had been installed at least five weeks before the start of the pre-promotion period, some concern was expressed that some residual novelty effect might remain.

Figure 4.4 below examines whether there was any remaining novelty effect in the 20 cent controls (which were new machines) by comparing the number of tests per week for these machines and $1 and $2 machines which were existing machines. There is

no evident downward trend in usage of 20 cent machines from two weeks prior to the commencement of the pre-promotion period (denoted W2) to the second week of the Level A promotion period (denoted A2). Therefore the number of tests for 20 control machines during the pre-promotion period was not likely to have been inflated by a residual novelty effect.

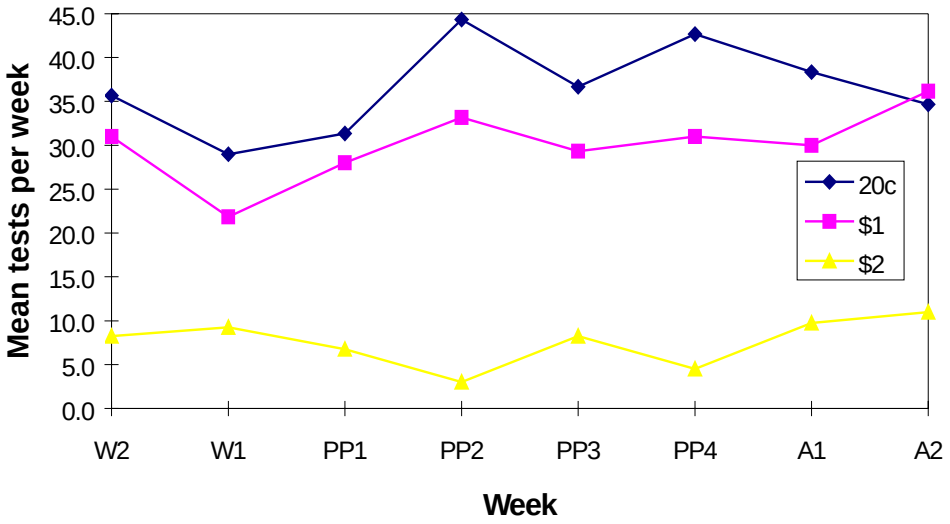

Figure 4.4. Mean tests per week (all BAC levels) for control machines. W2 denotes two weeks prior to the pre-promotion period, PP1 the first week of the pre-promotion period, A1 the first week of the Level A promotion period etc.

4.3 OBJECTIVE 1

The first objective of the study was to determine whether any promotional activity or combination of activities will result in 10% or more of drivers with BACs>.05 (the target group) using BTMs. Usage rates were calculated separately for each machine denomination because it was expected that higher rates might occur when the cost of testing was lower. As mentioned earlier, usage rates could only be calculated for experimental venues because no interviews were conducted at control venues.

The calculation of the usage rates is summarised in Appendix 5. The post promotion usage rates could not be calculated for venues ED and EK because there were no drivers with BAC>.05 at these venues in the second round of interviewing (and thus the proportion of patrons with BAC>.05 could not be estimated).

The mean usage rates (percent of drivers with BAC>.05 using the machine) before and after promotion for each denomination are presented in Figure 4.5.

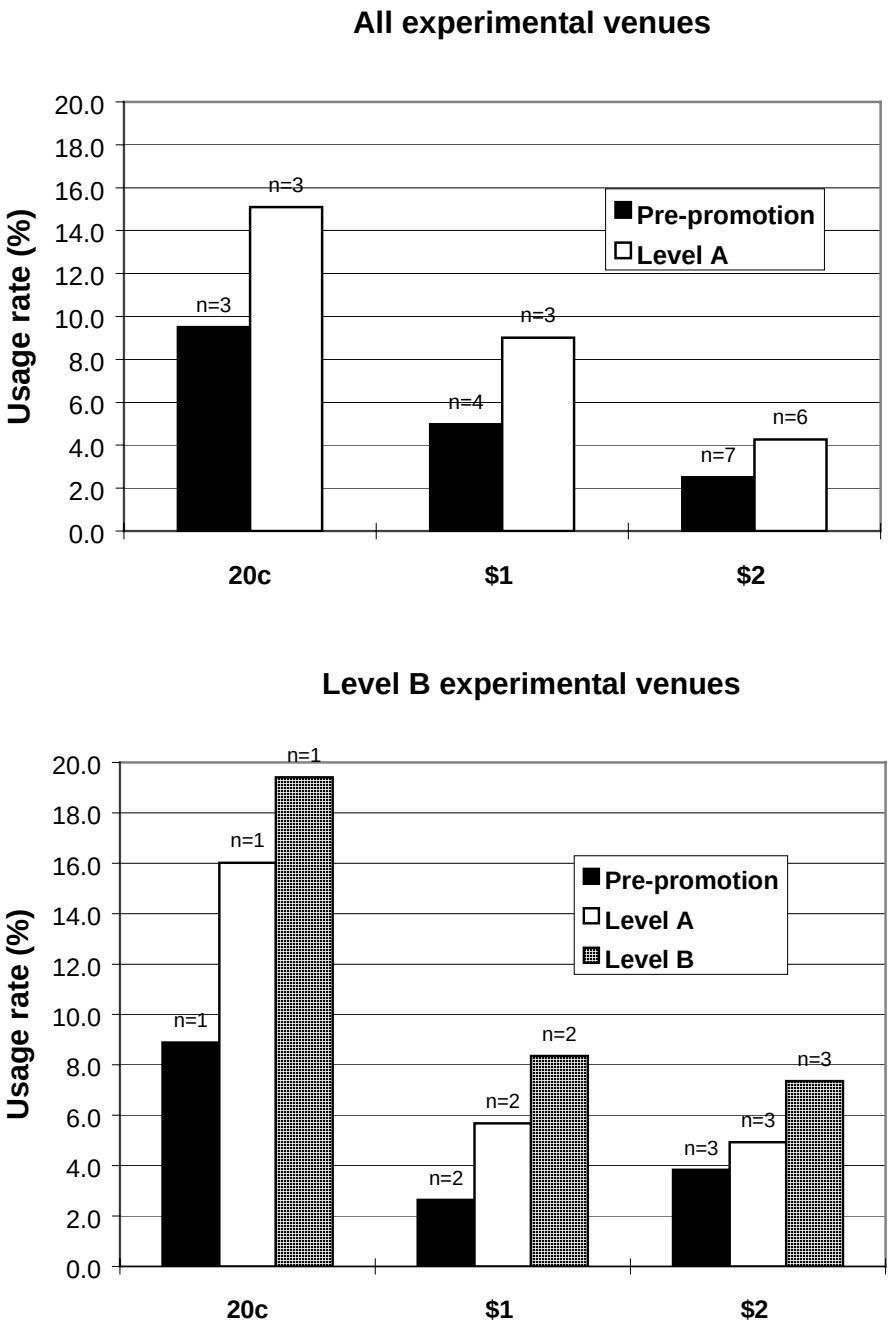

Figure 4.5. Usage rates during pre-promotion and Level A promotion for all venues (upper panel) and usage rates during pre-promotion, Level A and Level B promotion for Level B venues only (lower panel).

The number of venues contributing data is shown above each column. Usage rates for two machines which contributed pre-promotion data were unable to be calculated because there were no drivers with BAC>.05 during post-promotion interviewing.

4.3.1 Statistical analysis for Objective 1

The aim of the analyses presented here is to determine whether usage rates exceeded 10% after Level A promotional activities. Usage rates before promotional activities were also tested to determine if they exceeded 10%.

A logistic regression was used to calculate the grand means and 95% confidence limits for the usage rates in order to account for the small numbers of venues and the large variability in numbers of tests and patrons.

Comparisons were made for all machines combined and for each of the different denominations, separately. Given the small number of venues participating in Level B promotion at each denomination, comparisons were limited to pre-promotion versus promotion Level A.

The mean usage rates and their 95% confidence limits are presented in Table 4.1. Over all experimental venues, the mean usage rate was significantly **less than** 10% both before and after promotions. It should be noted that the overall mean usage rates are specific to the mixture of denominations used in the Pilot Study and care should be taken in generalising these rates.

Table 4.1. Summary of mean usage rates and confidence limits for usage rates.
The mean usage rate is greater than 10% if 10% is below the lower 95% confidence limit.

Usage rate	Number of venues	Mean usage rate (%)	95% confidence limit
All experimental machines			
Before promotion	14	4.4	4.1 to 5.4
Promotion Level A	12	7.8	7.0 to 8.9
Promotion Level B (Level B machines only)	6	7.7	6.2 to 9.4
20 cent machines			
Before promotion	3	9.5	7.8 to 11.4
Promotion Level A	3	15.1	12.6 to 17.7
$1 machines			
Before promotion	4	5.0	3.7 to 6.6
Promotion Level A	3	9.0	7.1 to 11.3
$2 machines			
Before promotion	7	2.5	1.9 to 3.3
Promotion Level A	6	4.3	3.3 to 5.4

When analysed according to machine denomination, usage rates, after Level A promotions (but not before), were significantly higher than 10% for venues with 20c machines. Usage rates were **not** significantly larger than 10% before or after promotion Level A for the $1 or $2 machines. This sub-analysis according to machine type should be viewed with caution since it is based on very small numbers of venues.

4.4 OBJECTIVE 2

The second objective of the Pilot Study was to determine the relative effectiveness of different promotional activities or combinations of activities in achieving increased usage rates for the target group. Examination of this objective was hampered by the small number of venues which participated and from which useable data were collected. There were only six venues for which promotion Level B usage rates were available.

The increases in usage rate with promotion are summarised in Table 4.2. The increase with Level B promotion appears to be smaller than that with Level A promotion (all machines or Level B only) for 20 cent and $1 machines.

Table 4.2. Mean usage rate after promotion minus mean usage rate before promotion.

Machine denomination	All venues	Level B venues only	
	Level A minus pre-promotion	Level A minus pre-promotion	Level B minus promotion Level A
20 cent	5.6	7.1	3.4
$1	4.0	3.0	2.7
$2	1.8	1.1	2.4

4.4.1 Statistical analysis of usage rate data

The usage rates for each venue were compared. The data for this analysis were the denomination of the machine, the estimated usage rate prior to promotion, the estimated usage rate after Level A promotion and the estimated usage rate after the Level B promotion. Because of the small numbers of cases, nonparametric analysis methods were used.

The Wilcoxon matched-pairs test was used to compare the median pre- promotion usage rates with those for Level A and Level B promotion. A one-tailed test was applied. A summary of the analysis is presented in Appendix 6.

Usage rates increased significantly from pre-promotion to promotion Level A ($p<.01$, 12 venues) and from pre-promotion to promotion Level B ($p<.05$, 6 venues). Usage rates did not, however, significantly improve further after Level B promotion when compared with Level A promotion ($p>.10$, 6 venues).

When data for the three machine denominations were analysed separately, the number of venues was quite small and so 0.10 was adopted as the significance level. At each denomination, the increase in usage rate from pre-promotion to promotion Level A was statistically significant (20c: $p<.10$, 3 venues; \$1: $p<.10$, 3 venues; \$2: $p<.10$, 6 venues). Further comparisons were not possible for 20 cent machines because there was only one Level B machine. Level B usage rates were significantly greater than pre-promotion rates for \$1 machines ($p<.10$, 2 venues) and \$2 machines ($p<.10$, 3 venues). Usage rates increased from Level A to Level B promotion for \$1 machines ($p<.10$, 2 venues) but not \$2 machines ($p>.10$, 3 venues).

It should be noted that these calculations are based on very small sample sizes. The results should therefore be interpreted with caution.

4.5 OBJECTIVE 3

The third objective of the project was to calculate the commercial viability of BTMs charging 20 cents, \$1 or \$2. This was undertaken by comparing the revenue after promotion for 20 cent, \$1 and \$2 machines. The calculations of monthly revenue are summarised in Appendix 7.

Table 4.3 summarises the number of tests and revenue per month after the commencement of the promotions. To increase the reliability of the data, data from venues which participated in Level B Promotion were included in Level A Promotion until Level B Promotion commenced. However, the number of venues at each denomination was very small for Level B Promotion and so the data may reflect differences in venues as well as differences in denominations.

Table 4.3 shows that the average number of tests per month was considerably greater for 20 cent machines than \$1 machines during both levels of promotion. However, the revenue for \$1 machines was more than double that for 20 cent machines. During Level A promotion there were similar numbers of tests for \$1 and \$2 machines, with consequently greater revenue for \$2 machines. During Level B promotion, there were fewer tests and lower revenue for \$2 machines than \$1 machines.

Different venues with the same machine denomination often exhibited large differences in the number of tests and hence, revenue. The ranges of numbers of tests and revenue are shown in Table 4.3. Clearly the revenue and financial viability of BTMs depends not only on the denomination of the machine but on the venue in which it is installed. Despite this variability, Table 4.3 shows that 20 cent machines, while averaging about 1.8 times as many tests per month, rarely produced more revenue than \$1 machines.

Table 4.3. Calculation of the revenue of BTMs charging 20 cents, $1 or $2.
Numbers of tests include invalid tests.

Machine denomination	No. of venues	Tests per month (range)	Revenue per month (range)
Level A Promotion (all experimental machines)			
20c	3	150 (128 to 200)	$30.00 ($25.60 to $40.00)
$1	5	83 (39 to 183)	$83.00 ($39.00 to $183.00)
$2	7	79 (16 to 139)	$158.00 ($32.00 to $278.00)
Level A Promotion (Level B machines only)			
20c	1	203	$40.60
$1	2	58 (22, 184)	$58 ($22 to $184)
$2	4	45 (16 to 62)	$90 ($32 to $124)
Level B Promotion			
20c	1	286	$57.20
$1	2	171 (51, 216)	$171.00 ($51.00 to $216.00)
$2	4	54 (49 to 59)	$108.00 ($98.00 to $118.00)

Comparison with the revenues for control venues (see Appendix 7) shows that the experimental and control venues were similar in terms of revenue.

4.6 POSSIBLE ADDITIONAL EFFECTS OF PROMOTION

In addition to increasing the usage rate of BTMs, promotion may have had other beneficial effects. Three possible additional effects of promotion were investigated:

1. whether promotion resulted in a reduction in misuse of the BTMs
2. whether promotion affected the BAC distribution of intending drivers
3. whether promotion changed the proportion of patrons with BACs>.05 who intended to drive

4.6.1 Promotion and misuse of BTMs

The posters and coasters used in Level A promotion stressed the accuracy of BTMs when used properly and gave instructions on proper use. Therefore the promotion may have reduced the proportion of high readings which were due to the presence of mouth alcohol.

Table 4.4 summarises the percentages of the BAC readings which were coded as invalid (BAC>.30) before and after the commencement of Promotion Level A. The clearest pattern in the table is the decrease in the percentage of tests which were invalid with increasing cost of testing. This probably reflects less game playing when the cost of testing is greater.

Table 4.4. Percentages of machine data from experimental venues which were invalid (BAC>.30) before and after commencement of promotion Level A.

Machine denomination	Number of venues	Before promotion	Promotion Level A
20 cents	3	9.8	6.2 (p<.05)
$1	5	2.7	5.7 (p<.05)
$2	7	1.4	2.9 (n.s.)
Overall	**15**	**5.3**	**4.7 (p<.05)**

Overall, the proportion of tests which were invalid decreased from 5.3% before promotion to 4.7% during Level A promotion. While this difference is small, it is statistically significant ($z=2.82$, $p<.05$). However, the change in the percentage of invalid tests was not consistent across machine denominations. The decrease with promotion in invalid readings for 20 cent machines was statistically significant ($z=2.61$, $p<.05$). However, the surprising increase in invalid readings with promotion for $1 Alcolizers was statistically significant ($z=2.66$, $p<.05$). The apparent increase with promotion in invalid data for $2 machines was not statistically significant ($z=1.80$, $p>.05$).

To be more certain that the changes in the proportions of tests which were invalid were due to promotion, the concurrent changes in the invalid data for control venues were examined. Figure 4.6 presents this comparison. It shows that the reduction in invalid tests for 20 cent machines was greater than for control machines, which supports the view that promotion led to the reduction for experimental machines. However, the increase in invalid tests for $1 experimental machines was greater than that for control machines, and the increase in invalid tests for $2 experimental machines occurred despite a decrease in invalid tests for $2 control machines. These data fail to support the view that promotion reduced invalid readings.

Overall, the results are contradictory regarding whether promotion reduces the proportion of high readings due to the presence of mouth alcohol.

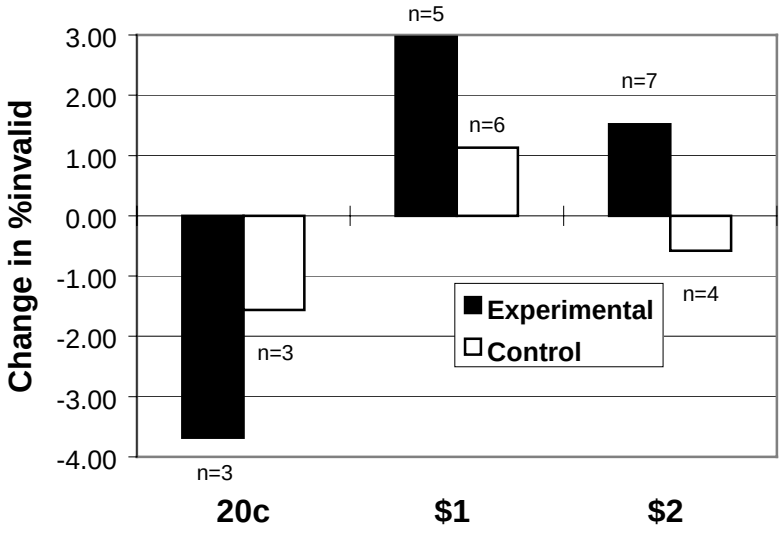

Figure 4.6. Change in percent of invalid readings from pre-promotion to Level A promotion for experimental and control venues.
Negative values are decreases in the percent invalid.

4.6.2 Promotion and the BAC distribution of intending drivers

The BAC levels and driving intentions of drivers interviewed are summarised in Table 4.5. The percentage of drivers interviewed whose BAC was greater than .05 fell from 23.8% during pre-promotion interviewing to 18.8% at post-promotion interviewing ($z=2.11$, $p<.05$). It is unclear whether this drop should be attributed to the increased use of machines resulting from the promotion, however. The increase in Transport Accident Commission drink driving publicity and random breath testing during the promotional periods and other seasonal factors may have contributed to the reduction, but the extent of this contribution cannot be gauged from the interview data.

4.6.3 Promotion and the proportion of drivers with BAC>.05 who intended driving

It is possible that the depiction of booze buses on the promotional material may have increased drivers' perceived risk of detection and thus made them less likely to drink drive. When interviewed, drivers whose BAC reading exceeded .05 were asked if they still intended driving away from the venue. Table 4.5 shows that, before the promotion, 67% of the drivers interviewed who were over .05 still intended to drive (or stated that they were unsure - the two responses were coded identically). After the promotion, about 80% of drivers interviewed who were over .05 still intended to drive (or stated that they were unsure). The increase was statistically significant ($z=-2.12$, $p<.05$). However, the last line in Table 4.5 shows that when expressed as a percentage of those *interviewed*, the proportion who intended driving with BAC>.05 was very similar both before and after promotion.

The lack of control information for interview data makes it difficult to interpret the increase in the proportion of drivers with BAC>.05 who still intended to drive. The effect of a reduction in the proportion of drivers who had BAC>.05 could have been to leave a pool of drivers with BAC>.05 who were more determined drink drivers.

Table 4.5. Summary of BAC levels and driving intentions for drivers interviewed.
Data from one venue which participated in interviewing before but not after promotion are not included.

	Interviewing before promotion	**Interviewing after promotion**
Number of drivers interviewed	546	368
Number of drivers with BAC>.05	130	69
Proportion of drivers with BAC>.05	0.238	0.188
Number of drivers with BAC>.05 who intended driving or were unsure	87	56
Proportion of drivers with BAC>.05 who intended driving or were unsure	0.669	0.811
Proportion of all drivers interviewed who intended driving and had BAC>.05	0.159	0.152

Tables analogous to Table 4.5 for each machine denomination are presented in Appendix 8. The results are summarised in Table 4.6. Each of the proportions appears to be higher for drivers interviewed at venues with 20 cent machines than for drivers interviewed at venues with $1 and $2 machines. This suggests that these venues have a generally higher consumption of alcohol per patron than the $1 and $2 venues.

Table 4.6. Summary of proportions of drivers with BAC>.05 and driving intentions for drivers interviewed at venues with 20 cents, $1 and $2 machines.
Data from one venue which participated in interviewing before but not after promotion are not included.

	Interview session	**Machine denomination**			
		20 cents	**$1**	**$2**	**Overall**
Proportion of drivers with BAC>.05	Before	0.37	0.18	0.22	0.24
	After	0.32	0.15	0.16	0.19
Proportion of drivers with BAC>.05 who intended driving or were unsure	Before	0.81	0.61	0.62	0.67
	After	0.90	0.67	0.81	0.81
Proportion of all drivers interviewed who intended driving and had BAC>.05	Before	0.30	0.11	0.14	0.16
	After	0.29	0.10	0.13	0.15

5. DISCUSSION AND CONCLUSIONS

5.1 SUMMARY OF THE RESULTS

5.1.1 Number of tests

The number of tests with BAC>.05 forms part of the numerator of the usage rate. This information was collected at both experimental and control venues.

The change in number of tests with BAC>.05 per day from the pre-promotion period to the Level A promotion period was no different for the experimental than the control machines. Therefore, there was no increase in the number of tests per day with Level A promotion when controlled for external influences. There was also no effect of machine denomination on this change.

Overall, the increase in number of tests with BAC>.05 per day from the pre-promotion period to the Level B promotion period was greater for the experimental than the control machines. However, the size of this effect differed according to machine denomination at experimental and control venues. Only for 20 cent machines did the increase from pre-promotion to Level B promotion appear to be greater for experimental than control venues.

5.1.2 Objective 1

The first objective of the study was to determine whether any promotional activity or combination of activities will result in 10% or more of drivers with BACs>.05 (the target group) using BTMs.

Over all experimental venues, the mean usage rate was significantly **less than** 10% both before and after promotions.

When analysed according to machine denomination, usage rates, after Level A promotions (but not before), were significantly higher than 10% for venues with 20c machines. Usage rates were **not** significantly larger than 10% before or after promotion, for the $1 or $2 machines. This sub-analysis according to machine type should be viewed with caution since it is based on very small numbers of venues.

5.1.3 Objective 2

The second objective of the Pilot Study was to determine the relative effectiveness of different promotional activities or combinations of activities in achieving increased usage rates for the target group.

Overall, there was a significant increase in usage rates after the promotion activities, for either the Level A or Level B promotions, compared with the pre-promotion usage rates. Usage rates did not, however, significantly improve further after Level B promotion, when compared with the usage rates for Level A promotion.

When analysed according to machine denomination, there was a trend towards a significant increase in usage rates with Level A promotion for all types of machine (taking 0.10 as the significance level). Although Level B promotion usage rates also tended towards a significant increase from the pre-promotion rates in the $2 machine venues, there was no significant improvement over the Level A usage rates.

It should be noted that these calculations are based on very small numbers of cases. For this reason, the probability value was increased from .05 to .10. The results should therefore be interpreted with caution.

5.1.4 Objective 3

The third objective of the project was to calculate the commercial viability of BTMs charging 20 cents, $1 or $2. This was undertaken by comparing the revenue after promotion for 20 cents, $1 and $2 machines.

The number of tests per month was approximately 1.8 times greater for 20 cent machines than $1 machines during both levels of promotion. However, the revenue for $1 machines was more than double that for 20 cent machines. During Level A promotion there were similar numbers of tests for $1 and $2 machines, with consequently greater revenue for $2 machines. During Level B promotion, there were fewer tests and lower revenue for $2 machines than $1 machines. This may be an artefact resulting from the small numbers involved.

Overall, the Pilot Study suggested that, on average, 20 cent machines would be commercially viable if the costs were less than $30 per month after Level A promotion or $57 per month after Level B promotion. Machines charging $1 would be commercially viable if the costs were less than $83 or $171 per month, respectively. Machines charging $2 would be commercially viable if the costs were less than $158 or $108 per month, respectively. Again the $108 per month after Level B promotion should be read with caution.

Different venues with the same machine denomination often exhibited large differences in the number of tests and, hence, revenue. Clearly the revenue and financial viability of BTMs depends not only on the denomination of the machine but on the venue in which it is installed. Despite this variability, 20 cent machines, while averaging about 1.8 times as many tests per month, rarely produced more revenue than $1 machines.

5.2 DISCUSSION OF THE RESULTS

5.2.1 Objective 1

The study showed that only for 20 cent machines was Level A promotion - providing coasters and posters regarding BTMs at venues - sufficient to result in more than 10% of drivers with BACs>.05 using the BTMs.

The analyses showed that usage rates after promotion were significantly greater than 10% for 20 cent machines but not for $1 or $2 machines. However, the small number of machines at each denomination mean that these results broken down by denomination should be treated with caution.

5.2.2 Objective 2

In general, placing coasters and posters in venues (Level A promotion) significantly increased usage rates but the addition of an inhouse promotion event and local media coverage (Level B promotion) did not produce any significant further increase.

The lack of a significant effect of Level B promotion could have resulted from a real lack of effect or an inability to demonstrate a real effect because of the small number of venues with Level B promotion in the study.

This finding may have resulted from the nature of the Level B promotion. The inhouse promotional event was conducted on one evening only, and is likely to have had a direct effect only on those patrons present at the time. There may have been some effect of the local media coverage on a larger number of patrons, but this is likely to have been a smaller effect. It is possible that more extensive promotion may have had an effect greater than that of posters and coasters but this cannot be determined from the Pilot Study.

The mechanism by which promotion increased usage rates was surprising. The formula for calculating usage rate has number of tests with BAC>.05 as the numerator and number of drivers with BAC>.05 as the denominator. The statistical tests showed that there was no significant increase in the number of tests (after adjusting for the change in the control venues) but there was a reduction in the number of drivers with BAC>.05. That is, the usage rate increased, not because the number of tests increased (as was expected), but because the number of drivers with BAC>.05 decreased.

The decrease in the proportion of patrons who were drivers with BAC>.05 from before promotion to after promotion may have been due to the increased level of Transport Accident Commission drink driving publicity and random breath testing, and the resultant increase in the perceived risk of being detected if drink driving. This may have resulted in drivers drinking less or drinkers deciding not to drive. The timing of interviewing and publicity supports this hypothesis. The pre-promotion interviewing occurred in July and August. The increased level of drink driving publicity and enforcement began in late September and continued until Christmas. The after promotion interviewing occurred in November and early December.

5.2.3 Objective 3

While the usage rates of 10% or greater were achieved for 20 cent machines in this study, the absolute number of tests, and thus revenue, was not great.

Methods of maximising the number of tests (and hence, revenue) are suggested by the variability between venues in the total revenue. The first is to target placement of machines in venues with large numbers of patrons. This was assumed in the calculations of Benefit-Cost Ratios by Haworth and Bowland (1995). It should be noted, however, that the increase in number of tests with increasing numbers of patrons may not be as great as expected. A multiple regression equation was computed for the current study to predict number of tests before promotion from number of patrons and cost of testing (see Appendix 9). The coefficient relating number of tests to number of patrons was not significant (b=0.00049, p=.14). The coefficient relating number of tests to cost of testing was significant, however (b=-0.022, p=.001). The lack of significant increase in number of tests with number of patrons may result from lack of easy access to, or visibility of, the BTM when the venue is large or crowded. Alternatively, it may be the result of different clientele at smaller and larger venues, with a different motivation to test themselves.

The second method of maximising number of tests and revenue may be to examine the characteristics of venues (other than number of patrons), which predict number of tests. In Appendix 10, usage rates of breath testing machines are examined according to two characteristics of each venue, location of the machine and size of the venue. Although there are a limited number of venues with 20c machines, usage rates do not appear to vary according to whether the machine was located in the public bar or in a throughput area (hallway or foyer). This finding is somewhat similar for $1 machines: usage rates were generally highest for machines located in the public bar or hall/foyer. Two dollar machines located in halls or foyers appears to be used at a consistent rate of 3 to 5. Machines located in public bars, however, show a variable usage rate (range 0.9 to 12.5). Generally, usage rates were lowest for machines located in gaming rooms or eating areas.

Usage rates again did not vary substantially for venues with 20c machines, regardless of the catchment area size. However, usage rates of $1 machines were higher in venues with small, rather than large, catchment areas. Findings are again less clear for $2 machines as rates are variable both within and between each catchment size.

An important issue, however, is the extent to which commercial viability should determine whether efforts are made to promote public breath testing. Commercial viability as measured by whether fine revenue covers the costs of testing and publicity, is not required for the most widespread means of deterring drink driving, random breath testing, rather the road safety benefits are achieved by the general deterrence level. In determining whether to promote the more widespread use of public breath testing, it is important to consider not only the aspect of commercial viability but the road safety benefits of increased testing as outlined by Haworth and Bowland (1995). Hence, if usage rates of greater than 10% can be achieved by subsidising the cost of 20 cent machines, an overall Benefit-Cost Ratio should be calculated on this basis.

5.3 CAVEATS

The caveats which should be placed upon interpretation of the results of this study relate to the sample size and the assumptions of the project design.

5.3.1 Sample size

The number of venues which participated was only about half of that anticipated during the early planning of the Pilot Study. As a result, the number of venues in each combination of machine denomination and level of promotion was very small. Thus some of the results which were found to be not statistically significant may have reflected the lack of power of the study, rather than the lack of a real effect.

5.3.2 Assumptions of the project design

It was necessary to make a number of assumptions in this pilot study. The assumptions can be divided into three sets: general assumptions, those related to interviewing and those related to machine data.

The project design made the general assumption that the premises which participated in the study are representative of licensed premises in metropolitan Melbourne (or Victoria). This assumption seems acceptable given the wide geographic and socioeconomic spread of the venues.

The assumptions related to interviewing were that:

1. the patrons who agreed to be interviewed were representative of all patrons at the venue
2. patrons responded truthfully when interviewed
3. the distributions of lengths of time patrons spent at the venues were the same during pre- and post-promotion interviewing
4. the method used for factoring up from number of patrons during 3 hours interviewing to number of patrons per week was correct

While the refusal rate was relatively low for an interview study, no information was collected to assess whether those patrons who refused had similar BACs and driving intentions as the patrons who agreed to be interviewed.

The assumption that patrons responded truthfully is of most concern when drivers with BACs>.05 are asked “Do you still intend to drive?”. Our experience in this area has been that drivers who still intend to drive but are unwilling to say so, will tell the interviewer that they are unsure whether they will drive. For this reason, responses of “unsure” were included with “intend to drive”. These responses were used in the calculation of the proportion of drivers who had BACs>.05.

Patrons were only asked about their expected duration of stay at the venue during post-promotion interviewing and the duration was assumed to be the same as for pre-

promotion interviewing. If pre-promotion durations were longer, then usage rates would be overestimated and vice versa.

In factoring up the estimated number of patrons during three hours of interviewing to a weekly estimate, it was assumed that the overall number of patrons per hour was two-thirds of the number during an hour of interviewing (because interviewing occurred during busy hours). If this assumption overestimated the number of patrons, the usage rate would be an underestimate.

An additional set of assumptions related to the machine data. It was assumed that:

1. BAC readings of greater than .300 were invalid readings, reflecting mouth alcohol
2. BAC readings of .05 or less truly reflected BACs of .05 or less and BAC readings of greater than .05 truly reflected BACs> .05
3. drivers and nondrivers were equally likely to have used the BTM
4. no patrons use the BTM more than once on the night
5. the patterns of usage during the data collection periods are representative of the entire year

The first two assumptions relate to the accuracy of the BAC readings. If the first assumption, which relates to the BTM readings, was untrue, then usage rates would be underestimated. The second assumption relates to both the BTM data and the hand-held testers used in interviewing. If the BTM readings gave an inaccurately high number of readings of BAC>.05 (perhaps due to mouth alcohol), then this would artificially increase the usage rates. The likelihood of mouth alcohol contributing to tests during interviewing was low because of safeguards specifically incorporated in the procedures to prevent this. However, if the hand-held testers gave an inaccurately high number of readings of BAC>.05, then the size of the target group would be inflated and thus the usage rates would be underestimated.

The third assumption was that drivers and nondrivers are equally likely to have used the BTM. This assumption was based on a finding of our earlier study (Haworth and Bowland, 1995). In the current study only drivers were asked whether they had tested themselves and so relative testing rates of drivers and nondrivers were not available. Adopting the assumption meant that the number of tests had to be multiplied by the proportion of patrons interviewed who were drivers (0.44). Thus the use of this assumption resulted in usage rates of less than half the value which would be found if the assumption was made that all testers were drivers.

The fourth assumption was necessary for using the number of BTM tests with BAC>.05 as part of the calculation of usage rate. If some readings result from patrons testing multiple times, then violation of these assumptions would lead to an inflation of the measured usage rate. Data collected during interviewing showed no evidence of repeat testing on the same night.

5.4 BENEFIT-COST RATIOS

5.4.1 Scope of measured benefits

There are both direct crash savings and indirect savings resulting from the use of public breath testers (Haworth and Bowland, 1995). The direct crash savings comprise the immediate reduction in crashes from drivers with BAC>.05 deciding not to drive home after testing themselves.

Indirect savings result from two sources. First, the immediate reduction in crashes from drivers moderating their total consumption after testing (they may still have BAC>.05). Secondly, longer-term crash reductions are expected due to drinkers who test themselves learning to better estimate their BAC and so being better at deciding when not to drive in the future, even when they have not tested themselves on that future occasion. This longer term educative effect could occur as a result of testing regardless of whether the person was intending to drive home on that occasion and regardless of whether the person had a BAC reading of >.05 at the time of testing.

In the current study, only drivers with a BAC over .05 were included in the target group. Therefore the second type of indirect saving is not measured in this study and so the calculated benefit-cost ratios are likely to be underestimates.

5.4.2 Calculation of benefit-cost ratios

In the previous report (Haworth and Bowland, 1995) the road safety benefits were calculated, if BTMs were installed in the 150 licensed establishments (hotels, licensed clubs or licensed restaurants) which pay the largest liquor licensing fees (and hence have largest retail liquor sales). It was estimated that if a usage rate of 10% (of intending drivers with BAC > .05) could be achieved, then a total crash savings of $634,000 per annum would result. This represents approximately 0.6% of the annual societal costs of alcohol related crashes in Melbourne. This current study has found usage rates averaging 9.5% in BTMs if the cost per test is lowered to 20 cents, even without publicity, resulting in estimated crash savings costs of $607,800 (0.6% of total societal costs of alcohol related crashes in Melbourne).

While the usage rates measured during Level A and Level B promotion were higher than before promotion, these increases are likely to have resulted from other factors including intensive drink driving publicity and enforcement and could not be assumed to occur if promotion was undertaken in the future. For this reason, BCRs have been calculated only for usage rates without promotion. It should be noted that higher usage rates would be expected in times of intense drink driving publicity and/or enforcement.

There are a number of ways in which the availability of 20 cent breath testing machines could be ensured at licensed establishments (such as hotels, licensed clubs or restaurants). These include a condition of the liquor licence (possibly only for those establishments whose sales exceed a specified level) to a subsidy for the purchase or rental of a 20 cent BTM.

For calculation of the societal benefit/cost ratio (BCR) the method of achieving the availability of these breath testing machines is not important, provided the costs of providing them are taken into account. Hence costs of providing machines are defined as the difference between the monthly rental and the revenue per machine. It is likely that more than one machine must be provided in the larger venues and for the purposes of this calculation it is assumed that a total of 300 machines would be required for the top 150 licensed establishments.

Table 5.1 shows the estimated BCRs for these 300 machines based on various net machine costs (monthly rental minus revenue), calculated assuming a 9.5% usage rate, without promotion. The calculations are made on an annual basis and hence have omitted the discount rate.

Table 5.1. Estimated BCRs for 300 20 cent machines.

	Net machine cost per month		
	$180	$150	$120
Net benefits (000) p.a.	$608	$608	$608
Net costs (000) p.a.	$648	$540	$432
BCR	0.94	1.13	1.41

The benefit cost ratios and associated confidence limits for 300 machines for all machine denominations are summarised in Table 5.2. The BCRs decrease as the cost of testing increases because of the reduction in usage rate (see Table 4.2). The only BCR significantly greater than 1.00 was for 20 cent machines with a net machine cost of $120 per month.

In Table 5.2 net machine costs per month (monthly rental minus revenue) are shown as $180 per month or $150 per month. The revenue data presented earlier in this report (Table 4.3) shows that, after promotion, revenue per month increased with machine denomination. The same pattern was evident before promotion, with monthly revenues of $39, $78 and $118 for 20 cent, $1 and $2 machines, respectively. If monthly rental was equal for all machines, this would result in net machine costs per month decreasing with increasing cost of testing. Therefore, compared to 20 cent machines, net machine costs per month for $1 machines would be $39 less and for $2 machines would be $79 less. Table 5.3 shows that including the differences in revenue across machine denomination does not change the outcome: the only BCR significantly greater than 1.00 is for 20 cent machines at $120 net machine cost per month.

Table 5.2. Summary of estimated BCRs for 300 machines at varying denominations. The values in brackets are 95% confidence limits for the BCRs. BCRs significantly greater than 1.00 are shown in bold text.

Cost of testing	Net machine cost per month		
	$180	$150	$120
20 cents	0.94 (0.77, 1.13)	1.13 (0.92, 1.35)	**1.41** (1.15, 1.69)
$1	0.49 (0.37, 0.65)	0.59 (0.44, 0.78)	0.74 (0.55, 0.98)
$2	0.25 (0.19, 0.33)	0.30 (0.23, 0.39)	0.37 (0.28, 0.49)

5.4.3 Conclusions from BCR calculations

The greatest benefit cost ratios are obtained by using twenty cent machines. For example, the estimated BCR for installing 300 twenty cent machines in the 150 highest volume liquor establishments is 1.41 if the net machine cost per month is $120. All other combinations of cost of testing and net machine cost per month lead to BCRs which are not statistically greater than 1.00.

In addition, there may be some smaller volume establishments with higher than average usage rates for which installation of twenty cent machines might result in a BCR significantly greater than one.

Table 5.3. Summary of estimated BCRs for 300 machines incorporating different revenue levels. The values in brackets are 95% confidence limits for the BCRs. BCRs significantly greater than 1.00 are shown in bold text.

Machine denomination	**Net machine cost per month**	**BCR**	**Net machine cost per month**	**BCR**	**Net machine cost per month**	**BCR**
20 cent	$180	0.94 (0.77, 1.13)	$150	1.13 (0.92, 1.35)	$120	**1.41** (1.15, 1.69)
$1	$141	0.63 (0.47, 0.83)	$111	0.80 (0.59, 1.06)	$81	1.10 (0.81, 1.45)
$2	$101	0.44 (0.33, 0.58)	$71	0.63 (0.48, 0.83)	$41	1.08 (0.82, 1.43)

5.5 IMPLICATIONS OF THE PILOT STUDY FOR MORE WIDESPREAD PROMOTION

The results of the study suggest that reducing the cost of testing to 20 cents would be a more effective way of increasing the number of drivers with BAC>.05 who test themselves, rather than committing resources to promotion.

Without promotion, almost 10% of readings for 20 cent machines were likely to have been contaminated by mouth alcohol. In the longer term, these high readings may reduce the credibility of the BTMs. The results of the study suggest that a valuable role for promotion is in reducing invalid tests, countering negative perceptions of the machines and teaching patrons on how to use them correctly (especially wait ten minutes after drinking).

In addition, to maximise the number of tests and thus the benefits in terms of road safety and commercial viability, there is a need to carefully target particular types of venues and locations for installation of BTMs. The variability among venues was very evident in this study. Venues varied in the number of tests, the proportion of drivers who had BAC>.05 and usage rates. Size of the venue clearly constrains the number of tests, but other factors also play a role. Lower usage rates (not numbers of tests) at some larger venues suggest that perhaps more than one machine could be placed there. Placement of the machine in the venue can influence the number of tests: machines placed where people are drinking most (or most people are drinking) are likely to be used more frequently than those placed in, for example, gaming rooms where little alcohol is consumed. A larger proportion of drivers have BAC>.05 at some venues than others. Identification and targeting of these venues would assist in maximising the usage rates and road safety benefits of BTMs.

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APPENDIX 1: FORMS FOR RECORDING RESPONSES

MONASH UNIVERSITY ACCIDENT RESEARCH CENTRE

PROMOTION OF COIN-OPERATED BREATH TESTING

Date: ..... Pub: ..... Interviewer: .....

Head Count	On arrival	1st hour	2nd hour	3rd hour

			Drivers only (including those who are uncertain)						
Time	Agreed	Drive away	BAC eg 105			Used machine	Still drive	Taxi voucher	Voucher No.
eg 12.45	Y/N	Y/N/?				eg 1, 2 ,3	Y/N/?	Y/N	

MONASH UNIVERSITY ACCIDENT RESEARCH CENTRE

PROMOTION OF COIN-OPERATED BREATH TESTING

Sheet No: .....

Date: ..... Pub: ..... Interviewer: .....

Head Count	On arrival	1st hour	2nd hour	3rd hour

			Drivers only (including those who are uncertain)								
Time	Agreed	Drive away	Arrival time	Depart time	BAC eg 105			Used machine	Still drive	Taxi voucher	Voucher No.
eg 12.45	Y/N	Y/N/?						eg 1, 2, 3	Y/N/?	Y/N	

APPENDIX 2: INTERVIEW MATRICES

PRE-PROMOTION INTERVIEWING

Weekday							
	Mean headcount	**Agreed**	**Refused**	**Drivers**	**Drivers with BAC>.05**	**Testers**	**Repeats**
20c Alcolizer							
EA	17.75	28	0	9	2	0	0
EB	15.75	31	0	14	7	1	0
EC	10.88	19	4	8	1	0	0
$1 Alcolizer							
ED	11.25	18	1	8	1	0	0
EE	72.38	71	1	35	13	0	0
EF	11.00	22	2	5	3	0	0
EG	44.43	86	24	45	5	0	0
EH	19.88	25	8	15	6	0	0
$2 Breathometer							
EI	12.75	12	0	4	0	0	0
EJ	36.13	64	3	26	3	0	0
EK	2.75	6	1	4	0	0	0
EL	8.13	15	3	4	1	0	0
EM	13.00	18	5	8	5	1	0
EN	17.75	11	5	4	3	0	0
EO	18.25	43	10	31	5	5	0
Weekend							
	Mean headcount	**Agreed**	**Refused**	**Drivers**	**Drivers with BAC>.05**	**Testers**	**Repeats**
20c Alcolizer							
EA	41.67	54	14	28	10	0	0
EB	30.88	50	3	14	6	0	0
EC	29.75	36	7	26	11	3	0
$1 Alcolizer							
ED	11.75	24	0	13	2	0	0
EE	115.63	123	4	32	8	0	0
EF	7.25	18	2	11	5	0	0
EG	60.00	89	14	46	3	0	0
EH	17.88	44	1	12	3	0	0
$2 Breathometer							
EI	23.50	64	4	28	5	0	0
EJ	122.00	159	8	81	28	0	0
EK	9.13	24	0	14	1	0	0
EL	29.88	30	12	12	2	0	0
EM	11.30	10	0	4	1	0	0
EN	41.67	125	11	61	5	0	0
EO	59.63	29	12	11	5	0	0

POST-PROMOTION INTERVIEWING

Weekday							
	Mean headcount	**Agreed**	**Refused**	**Drivers**	**Drivers with BAC>.05**	**Testers**	**Repeats**
20c Alcolizer							
EA	40.4	16	13	9	1	-	-
EB	19.1	30	5	8	2	1	0
EC	20.7	19	7	7	0	0	0
$1 Alcolizer							
ED	10.4	12	2	5	0	0	0
EE							
EF	50.9	46	3	11	5	0	0
EG	191.0	22	1	15	0	-	-
EH	18.0	9	2	7	0	-	-
$2 Breathometer							
EI	74.2	43	0	27	3	0	0
EJ	53.5	27	5	9	1	1	0
EK	196.4	75	4	26	0	0	0
EL	20.6	14	3	10	1	0	0
EM	18.2	31	1	12	0	0	0
EN	64.3	41	1	7	0	0	0
EO	125.3	106	7	28	7	0	0
	Weekend						
	Mean headcount	**Agreed**	**Refused**	**Drivers**	**Drivers with BAC>.05**	**Testers**	**Repeats**
20c Alcolizer							
EA	122.5	29	35*	15	6	0	0
EB	35.9	36	0	4	3	0	0
EC	77.1	28	21	22	9	4	0
$1 Alcolizer							
ED	44.3	24	0	13	0	0	0
EE							
EF	23.1	18	1	1	0	0	0
EG	202.2	18	15	9	2	-	-
EH	25.2	27	4	19	5	-	-
$2 Breathometer							
EI	91.9	49	6	10	3	0	0
EJ	129.4	51	5	20	4	2	0
EK	28.1	13	0	6	0	0	0
EL	23.1	15	3	4	1	0	0
EM	14.1	19	2	10	3	0	0
EN	93.3	69	2	16	1	0	0
EO	227.5	110	1	38	12	0	0

APPENDIX 3: SUMMARY OF MACHINE DATA

MEAN TESTS PER DAY - EXPERIMENTAL GROUP

	PRE-PROMOTION PERIOD					PROMOTION - LEVEL A					PROMOTION - LEVEL B				
Venue	DAYS	<=.05	>.05	Invalid	Total	DAYS	<=.05	>.05	Invalid	Total	DAYS	<=.05	>.05	Invalid	Total
20c Alcolizer															
EA	42	1.64	3.79	0.52	5.95	8	0.75	4.75	1.25	6.75	63	2.41	5.76	1.37	9.54
EB	45	1.09	4.02	1.07	6.18	66	0.80	3.08	0.39	4.27					
EC	44	1.86	4.41	0.23	6.50	66	0.76	4.64	0.11	5.50					
Mean		**1.52**	**4.08**	**0.61**	**6.21**		**0.78**	**3.91**	**0.31**	**4.99**		**2.41**	**5.76**	**1.37**	**9.54**
$1 Alcolizer															
ED	45	0.58	1.20	0.11	1.89	66	0.73	1.38	0.03	2.14					
EE	52	0.69	1.42	0.10	2.21	66	0.32	0.91	0.08	1.30					
EF	55	0.84	2.53	0.09	3.45	66	1.47	4.02	0.14	5.62					
EG	56	2.48	1.84	0.05	4.38	14	2.50	3.50	0.14	6.14	63	2.95	4.08	0.16	7.19
EH	41	0.24	0.29	0.00	0.54	49	0.18	0.53	0.02	0.73	23	0.43	1.17	0.09	1.70
Mean		**1.28**	**1.67**	**0.05**	**3.00**		**1.09**	**2.64**	**0.09**	**3.82**		**2.28**	**3.30**	**0.14**	**5.72**
$2 Breathometer															
EI	48	0.17	0.15	0.00	0.31	15	0.33	0.20	0.00	0.53	63	0.54	0.71	0.05	1.30
EJ	42	0.79	1.50	0.07	2.36	66	0.86	2.32	0.05	3.23					
EK	43	0.95	0.42	0.00	1.37	22	0.73	0.64	0.00	1.36	63	0.83	1.06	0.00	1.89
EK	33	0.18	0.39	0.00	0.58	42	0.31	0.69	0.05	1.05	42	0.31	0.52	0.02	0.86
EM	43	0.91	1.26	0.02	2.19	64	0.80	1.22	0.03	2.05	28	1.04	1.18	0.04	2.21
EN	41	1.41	2.00	0.07	3.49	66	1.97	2.64	0.02	4.62					
EO	26	1.00	1.85	0.00	2.85	66	1.08	1.12	0.27	2.47					
Mean		**0.76**	**1.03**	**0.02**	**1.82**		**1.01**	**1.54**	**0.08**	**2.62**		**0.65**	**0.85**	**0.03**	**1.53**

MEAN TESTS PER DAY - CONTROL GROUP

	PRE-PROMOTION PERIOD					PROMOTION - LEVEL A					PROMOTION - LEVEL B				
Venue	DAYS	<=.05	>.05	Invalid	Total	DAYS	<=.05	>.05	Invalid	Total	DAYS	<=.05	>.05	Invalid	Total
20c Alcolizer															
CA	28	2.00	3.79	0.29	6.07	36	2.03	3.31	0.47	5.81	44	1.14	2.52	0.09	3.75
CB	28	1.54	5.18	1.14	7.86	36	0.89	5.36	0.58	6.83	44	1.48	3.61	0.34	5.43
CC	28	0.79	1.86	0.04	2.68	36	1.08	1.53	0.06	2.67	44	1.11	1.59	0.11	2.82
Mean		**1.44**	**3.61**	**0.49**	**5.54**		**1.33**	**3.40**	**0.37**	**5.10**		**1.24**	**2.58**	**0.18**	**4.00**
$1 Alcolizer															
CD	28	1.75	6.36	0.29	8.39	36	1.83	7.72	0.53	10.08	44	2.45	6.57	0.18	9.20
CE	28	0.71	2.93	0.32	3.96	36	0.56	1.81	0.19	2.56	44	1.30	4.61	0.59	6.50
CF	28	2.82	2.82	0.00	5.64	36	2.33	4.39	0.08	6.81	44	4.02	5.68	0.02	9.73
CG	28	0.46	2.75	0.21	3.43	36	0.53	2.28	0.28	3.08	44	0.89	3.30	0.34	4.52
CH	28	1.46	1.25	0.04	2.75	36	1.86	1.28	0.14	3.28	44	1.95	2.39	0.07	4.41
CI	28	0.25	0.96	0.11	1.32	36	0.11	0.58	0.08	0.78	44	0.59	1.59	0.07	2.25
Mean		**1.24**	**2.85**	**0.16**	**4.25**		**1.20**	**3.01**	**0.22**	**4.43**		**1.87**	**4.02**	**0.21**	**6.10**
$2 Breathometer															
CJ	28	0.29	0.54	0.00	0.82	36	0.64	1.14	0.00	1.78	44	0.68	1.95	0.11	2.75
CK	28	0.50	0.36	0.00	0.86	36	0.56	0.25	0.00	0.81	44	0.52	0.64	0.02	1.18
CL	28	0.21	0.43	0.04	0.68	36	0.58	0.47	0.03	1.08	44	0.55	1.55	0.05	2.14
CM	28	0.46	0.36	0.00	0.82	36	0.53	0.97	0.00	1.50	44	0.48	2.02	0.05	2.55
Mean		**0.37**	**0.42**	**0.01**	**0.79**		**0.58**	**0.71**	**0.01**	**1.29**		**0.56**	**1.54**	**0.06**	**2.15**

* Edwards Lakes excluded due to too much missing data (machine vandalism)

APPENDIX 4: CALCULATION OF NUMBER OF PATRONS AT VENUES

Why calculation of number of patrons was necessary

An estimate of the number of people at each venue was necessary to supply the denominator term for the usage rate formula

$$\textit{usage rate} = \frac{\textit{no. of tests with BAC>.05 x proportion of testers who were drivers}}{\textit{no. of patrons x proportion of patrons who intend to drive and have BAC>.05}} \textit{ x 100}$$

The actual magnitude of the number of patrons is crucial for Objective 1, where the actual usage rate is to be compared with 10%. However, it is only the relative change in total number of patrons from before to after interviewing that is important for Objective 2.

The procedure for counting patrons

Each interviewer counted (or estimated if a direct count was not possible) the number of patrons present in the area of the venue where interviewing was taking place. The counts were taken at the beginning of the 1st, 2nd and 3rd hours of interviewing and at the end of the 3rd hour of interviewing.

This procedure was adopted because of the difficulty in constantly monitoring the number of people present, entering and leaving the venue at the same time as interviewing. These counts were termed "headcounts" but are not equivalent to the total number of patrons since double counting of patrons who stayed longer than one hour is likely to have occurred and patrons who stayed less than one hour may not have been counted.

Transforming headcounts to estimates of total number of patrons

The means of the eight headcount values (4 time periods x 2 interviewers) are shown in the third and sixth columns of Table A4.1. The mean headcount is clearly an **under**estimate of the total number of different people at the venue over the three hour period because the mean is less than the total number of patrons interviewed at many venues. Using the mean headcount as the denominator and the number of drivers over .05 as the numerator would result in an **over**estimate of the proportion of patrons at the venue who were drivers over .05.

Table A4.1. Total number of interviews and mean headcounts at each venue for interviews conducted before and after promotion.

The ratio of the number of interviews to the mean headcount is presented where the number of interviews is less than 50.

INTERVIEWS CONDUCTED BEFORE PROMOTION

	WEEKDAY			WEEKEND		
Venue	**interviews**	**mean headcount**	**ratio interviews: headcount**	**interviews**	**mean headcount**	**ratio interviews: headcount**
EA	28	17.8	1.58	68	41.7	
EB	31	15.8	1.97	53	30.9	
EC	23	10.9	2.11	43	29.8	1.45
ED	19	11.3	1.69	24	11.8	2.04
EF	24	11.0	2.18	20	7.3	2.76
EG	110	44.3		103	60.0	
EH	33	19.9	1.66	45	17.9	2.52
EI	12	12.8	0.94	68	23.5	
EJ	67	66.1		167	122.0	
EK	7	2.8	2.55	24	9.1	2.63
EL	18	8.1	2.21	42	29.9	1.41
EM	23	13.0	1.77	10	11.3	0.88
EN	16	17.8	0.90	136	41.7	
EO	53	18.3		41	59.6	0.69

INTERVIEWS CONDUCTED AFTER PROMOTION

	WEEKDAY			WEEKEND		
Venue	**interviews**	**mean headcount**	**ratio interviews: headcount**	**interviews**	**mean headcount**	**ratio interviews: headcount**
EA	29	22.0	1.32	64	46.7	
EB	35	13.0	2.69	36	25.3	1.42
EC	26	13.0	2.00	49	39.7	1.24
ED	14	3.3	4.20	24	12.7	1.89
EF	19	33.7	0.56	19	11.7	1.63
EG	23	61.7	0.37	33	83.0	0.40
EH	11	10.7	1.03	31	14.7	2.11
EI	43	30.3	1.42	55	30.3	
EJ	32	22.7	1.41	56	22.7	
EK	79	65.3		13	8.3	1.56
EL	17	13.3	1.28	18	13.7	1.32
EM	32	11.3	2.82	21	10. 0	2.10
EN	42	35.0	1.20	71	50.7	
EO	113	63.3		111	130.3	

Two methods of estimating the total number of patrons were attempted.

1. The ratio method

The first method assumed that if the number of interviews (those who agreed plus those who refused) was lower than a threshold value of 50, then all patrons had been interviewed. Therefore the number of interviews is the best estimator of the number of people who were in the venue during the period. The ratio of the number of interviews to the mean headcount was then calculated and applied to the mean headcounts for those venues where the number of interviews was above the threshold.

The number of interviews, mean headcount and ratio of these two values for each venue are presented in Table A4.1. The ratios differed among the venues. For the interviews conducted before promotion, the averages of the ratios were 1.78 on weekdays and 1.80 on weekends. For interviews conducted after promotion, the averages were 1.81 for weekdays and 1.66 for weekends.

2. The duration method

The second method involved asking patrons when they arrived at the venue and when they intended to leave to calculate a mean duration of stay (D) for each venue for weekdays and weekends. These questions were asked only at the time of the post-promotion interviewing. The calculated mean duration allowed the subsequent headcounts to be corrected for double counting of persons and therefore an estimate of the total number of different persons at the venue during the three hour period to be calculated.

The total number of persons was calculated as N0 + N1 + N2, where

N0=H0
N1=H1-H0+(H0/D)
N2=H2-H0+2H0/D-N1+N1/D

N is the number of persons,
H is the headcount,
D is the duration in hours
and 0, 1, 2 refer to the beginning of interviewing, and the beginning of the first and second hours of interviewing, respectively.

The mean durations and estimates of the total numbers of patrons are presented in Table A4.2. It can be seen from this Table that many of the mean durations are based on small numbers of interviews and so small numbers of observations. The D values are thus much less reliable than the headcounts. The lack of reliability of some D values resulted in some estimates of the total number of patrons being unrealistic. For example, the three headcounts for the ED on the weekend were 11, 12 and 15, totalling 38 persons (including possible double-counting). Yet the estimated number of patrons according to the D value was 44.3.

Table A4.2. Calculation of numbers of persons at venues during three hours of post-promotion interviewing.

H0 is the headcount at the beginning of the first hour of interviewing, H1 the headcount at the end of the first hour of interviewing and H2 is the headcount at the end of the second hour of interviewing. N is the number of drivers interviewed - only drivers were asked about duration.

Venue	Time period	H0	H1	H2	D	N	Estimated patrons
EA	Weekday	16	28	22	2:43	9	40
	Weekend	54	49	37	1:36	11	122
EB	Weekday	13	13	13	2:58	7	19
	Weekend	21	30	25	5:03	3	36
EC	Weekday	18	18	3	2:27	7	21
	Weekend	30	41	48	2:49	22	77
ED	Weekday	2	0	8	1:26	5	10
	Weekend	11	12	15	1:07	13	44
EF	Weekday	37	34	30	3:51	10	51
	Weekend	13	11	11	2:25	1	23
EG	Weekday	50	62	73	1:17	12	191
	Weekend	73	90	86	1:46	9	202
EH	Weekday	12	10	10	3:12	7	18
	Weekend	16	16	12	2:51	19	25
EI	Weekday	16	20	55	2:15	10	74
	Weekend*	67	32	32	2:10	27	92
EJ	Weekday	25	25	18	1:48	9	53
	Weekend	55	58	88	3:25	19	129
EK	Weekday	39	84	73	1:42	26	196
	Weekend	15	9	1	1:52	6	28
EL	Weekday	16	14	10	3:18	10	21
	Weekend	12	15	14	3:22	4	23
EM	Weekday	15	11	8	3:02	12	18
	Weekend	13	9	8	4:08	9	14
EN	Weekday	36	40	29	2:33	7	64
	Weekend	61	51	40	2:33	16	93
EO	Weekday	50	65	75	2:40	25	125
	Weekend	123	140	128	3:03	38	227

* H1 count has been repeated for H2. Interviewer did not do a headcount at H2.

The estimates of the total number of patrons according to the two methods are compared in Table A4.3. For most venues, the estimate obtained using the duration method was greater than that obtained by the ratio method. The magnitude of the discrepancy was greater than 10% in most instances. The average estimates for the two methods before promotion were 40 and 50 and the average estimates after promotion were 50 and 63.

Table A4.3. Comparisons of the estimates of the total number of patrons according to the ratio and duration methods of calculation.

Data from venues EE and EG have been removed because management restrictions prevented it being collected in the appropriate manner.

		BEFORE PROMOTION		AFTER PROMOTION	
Venue	**Time period**	**Ratio method**	**Duration method**	**Ratio method**	**Duration method**
EA	Weekday	28	36	29	40
	Weekend	75	107	72	125
EB	Weekday	31	20	35	19
	Weekend	56	46	36	36
EC	Weekday	23	23	26	21
	Weekend	43	61	49	77
ED	Weekday	19	31	14	10
	Weekend	24	33	24	44
EF	Weekday	24	19	19	51
	Weekend	20	17	19	23
EH	Weekday	33	36	11	18
	Weekend	45	32	31	25
EI	Weekday	12	32	43	74
	Weekend	42	54	72	92
EJ	Weekday	64	96	32	54
	Weekend	220	263	111	129
EK	Weekday	7	10	118	196
	Weekend	24	23	13	28
EL	Weekday	18	14	17	21
	Weekend	42	46	18	23
EM	Weekday	23	22	32	18
	Weekend	10	12	21	14
EN	Weekday	16	38	42	64
	Weekend	75	117	84	93
EO	Weekday	32	31	115	125
	Weekend	41	98	216	228
Average number of patrons		**40**	**50**	**50**	**63**

If the assumptions behind the ratio method are correct, it should give accurate estimates when the number of patrons is relatively small and less accurate estimates when the number is larger. The ratio method should be equally accurate for before and after promotion.

The duration method should be more accurate for after promotion than before promotion because the durations are based on data from after promotion interviewing

only. This method should be more accurate for larger numbers because then D (duration) is based on a larger number of observations.

The analyses were conducted using the estimates from the duration method because its tendency to give larger estimates for number of patrons would lead to more conservative estimates of usage rates.

Estimating number of patrons per week

The discussion thus far has dealt only with estimating the total number of patrons at each venue during the three hours of interviewing. What is needed for calculation of the usage rate is the total number of patrons at each venue over the period for which the machine data is collected.

Simply scaling up from the three hours of weekday and weekend interviewing to the number of weekday and weekend hours that the venue is open would overestimate the total number of patrons because busier periods were intentionally chosen for interviewing to maximise the number of interviews. To produce a more realistic estimate, the scaled up figure was multiplied by 67%.

APPENDIX 5: CALCULATION OF USAGE RATES

The usage rate was calculated in the tables which follow according to the following formula:

$$\text{Usage rate} = \frac{\text{Tests>.05/Days x 0.44 (Proportion of testers who were drivers)}}{\text{Proportion of drivers>.05 x Patrons}}$$

Table A5.1. Calculation of estimated usage rates from numbers of tests with BAC>.05, number of days for which machine data were measured, estimated number of patrons, and proportion of patrons who were drivers with BAC>.05.

Pre-promotion estimated usage rates

Venue	Tests>.05	Days	Estimated no. of patrons	Proportion drivers>.05	Usage rate
20c Alcolizer					
EA	159	42	1051	0.125	8.9
EB	181	45	741	0.155	10.8
EC	194	44	840	0.182	8.9
$1 Alcolizer					
ED	54	45	564	0.070	9.4
EE	74	52	*	0.106	#DIV/0!
EF	139	55	407	0.182	10.5
EG	103	56	3871	0.038	3.9
EH	12	41	881	0.115	0.9
$2 Breathometer					
EI	7	48	742	0.063	1.0
EJ	63	42	3713	0.132	0.9
EK	18	43	324	0.032	12.5
EL	13	33	557	0.050	4.4
EM	54	43	382	0.182	5.5
EN	82	41	2588	0.053	4.5
EO	48	26	1491	0.106	3.6

* The estimated number of patrons could not be calculated for EE because the formula required the mean duration of stay which was only collected during post-promotion interviewing. Management refused permission for post-promotion interviewing at this venue.

Promotion Level A

Venue	Tests>.05	Days	Estimated no. of patrons	Proportion drivers>.05	Usage rate
20c Alcolizer					
EA	38	8	1220	0.075	16.0
EB	203	66	613	0.070	22.1
EC	306	66	1002	0.120	11.9
$1 Alcolizer					
ED	91	66	539	0.000	#DIV/0!
EE	60	66	*		#DIV/0!
EF	203	66	802	0.074	20.9
EG	49	14	4127	0.036	7.3
EH	26	49	585	0.119	2.3
$2 Breathometer					
EI	3	15	1440	0.061	0.7
EJ	153	66	1880	0.057	6.6
EK	14	22	1805	0.000	#DIV/0!
EL	29	42	391	0.057	9.5
EM	78	64	375	0.057	17.6
EN	174	66	2516	0.009	35.9
EO	74	66	3992	0.085	1.0

* The estimated number of patrons could not be calculated for EE because the formula required the mean duration of stay which was only collected during post-promotion interviewing. Management refused permission for post-promotion interviewing at this venue.

Promotion Level B

Venue	Tests>.05	Days	Estimated no. of patrons	Proportion drivers>.05	Usage rate
20c Alcolizer					
EA	363	63	1220	0.075	19.4
$1 Alcolizer					
EG	257	63	4127	0.036	8.4
EH	27	23	585	0.119	5.2
$2 Breathometer					
EI	45	63	1440	0.061	2.5
EK	67	63	1805	0.000	#DIV/0!
EL	22	42	391	0.057	7.3
EM	32	28	375	0.057	16.5

APPENDIX 6: SUMMARIES OF STATISTICAL ANALYSES

COMPARISONS OF AVERAGE NUMBERS OF TESTS WITH BAC>.05

Table A6.1. Summary of the differences in the average numbers of tests per day with BAC>.05 across all machines. Differences were calculated separately for weekday and weekend, which doubled the number of observations.

Comparison	n	Mean difference	std dev (difference)	range of differences	no of differences with post average > pre average	% of differences with post average > pre average
ALL MACHINES						
pre vs post Level A	56	0.144	0.112	-1.754 to 2.375	33	58.9
pre vs post Level B	40	0.696	0.209	-2.114 to 4.040	29	72.5

Table A6.2: ANOVA results for comparing average numbers of tests with BAC>.05 before and after Level A promotion.

Source of Variation		Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects		1.205	4	0.301	0.385	0.818
Venue type	(Experimental vs control)	0.204	1	0.204	0.261	0.612
Machine denomination		0.803	2	0.401	0.514	0.602
Time of week		0.187	1	0.187	0.239	0.627
2-Way Interactions		1.656	5	0.331	0.424	0.83
Venue type	Machine denomination	0.497	2	0.248	0.318	0.729
Venue type	Time of week	0.084	1	0.084	0.107	0.745
Machine denomination	Time of week	0.962	2	0.481	0.615	0.545
Explained		4.307	11	0.392	0.501	0.892
Residual		34.386	44	0.782		
Total		38.694	55	0.704		

Table A6.3: ANOVA results for comparing average numbers of tests with BAC>.05 before and after Level B promotion.

Values in bold represent statistically significant results.

Source of Variation		Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects		12.297	4	3.074	2.637	0.055
Venue type	(Experimental vs control)	5.464	1	5.464	4.686	**0.039**
Machine denomination		4.295	2	2.148	1.842	0.177
Time of week		2.171	1	2.171	1.862	0.183
2-Way Interactions		14.778	5	2.956	2.535	0.052
Venue type	Machine denomination	14.478	2	7.239	6.208	**0.006**
Venue type	Time of week	0.028	1	0.028	0.024	0.877
Machine denomination	Time of week	0.3	2	0.15	0.129	0.880
Explained		35.268	11	3.206	2.75	0.015
Residual		32.649	28	1.166		
Total						

Number of tests>.05 increased significantly after Level B promotion for E venues, especially the single 20c venue.

COMPARISONS OF USAGE RATES BEFORE AND AFTER PROMOTIONS

Table A6.4. Comparison of usage rates before and after the various promotions.
Values in bold represent statistically significant results.

Comparison	Usage rate pairs compared (ie venues)	P-value	Comment
All machines			
pre vs post Level A	12	**0.003**	10/12 machines had higher post usage rates
pre vs post Level B	6	**0.014**	all machines had higher post usage rates
post Level A vs post Level B	6	0.125	4/6 machines had higher post Level B rates
20c machines			
pre vs post Level A	3	**0.055**	all had higher post usage rates
pre vs post Level B	1	**	
post Level A vs post Level B	1	**	
$1 machines			
pre vs post Level A	3	**0.055**	all had higher post usage rates
pre vs post Level B	2	**0.090**	all had higher post usage rate
post Level A vs post Level B	2	**0.090**	all had higher post Level B rates
$2 machines			
pre vs post Level A	6	**0.058**	4/6 machines had higher post rates
pre vs post Level B	3	**0.054**	all had higher post rates
post Level A vs post Level B	3	0.297	1/3 had higher rate after Level B

** unable to be computed because there was only 1 machine

APPENDIX 7: REVENUE ESTIMATES

Table A7.1. Number of tests per month and revenue for Promotion Level A.
All experimental venues included. The number of tests includes weekday and weekend and invalid tests. A month is 30 days.

Venue	Months	Tests per month	Estimated monthly revenue
20 cent Alcolizer			($)
EA	0.27	200	40.00
EB	2.20	128	25.60
EC	2.20	165	33.00
$1 Alcolizer			
ED	2.20	64	64.00
EE	2.20	39	39.00
EF	2.20	128	128.00
EG	0.47	183	183.00
EH	1.63	22	22.00
$2 Breathometer			
EI	0.50	16	32.00
EJ	2.20	97	194.00
EK	0.73	41	82.00
EL	1.40	31	62.00
EM	2.13	62	128.00
EN	2.20	139	278.00
EO	2.20	74	148.00

Table A7.2. Number of tests per month and revenue for Promotion Level B.
The number of tests includes weekday and weekend and invalid tests. A month is 30 days.

Venue	Months	Tests per month	Estimated monthly revenue
20 cent Alcolizer			($)
EA	2.10	286	57.20
$1 Alcolizer			
EG	2.10	216	216.00
EH	0.77	51	51.00
$2 Breathometer			
EI	1.50	55	110.00
EK	2.23	53	106.00
EL	0.73	49	98.00
EM	1.07	58	116.00

Table A7.3. Number of tests per month and revenue for control venues during Promotion Level A.
All control venues included. The number of tests includes weekday and weekend and invalid tests. A month is 30 days.

Venue	Months	Tests per month	Estimated monthly revenue
20 cent Alcolizer			($)
CA	0.93	225	45.00
CB	0.93	265	53.00
CC	0.93	103	20.60
$1 Alcolizer			
CD	0.93	390	390.00
CE	0.93	99	99.00
CF	0.93	263	263.00
CG	0.93	119	119.00
CH	0.93	127	127.00
CI	0.93	30	30.00
$2 Breathometer			
CJ	0.93	69	138.00
CK	0.93	31	62.00
CL	0.93	42	84.00
CM	0.93	58	116.00

Table A7.4. Number of tests per month and revenue for control venues during Promotion Level B.

The number of tests includes weekday and weekend and invalid tests. A month is 30 days.

Venue	Months	Tests per month	Monthly revenue
20 cent Alcolizer			($)
CA	1.47	112	22.40
CB	1.47	163	32.60
CC	1.47	84	16.80
$1 Alcolizer			
CD	1.47	276	276.00
CE	1.47	195	195.00
CF	1.47	291	291.00
CG	1.47	135	135.00
CH	1.47	132	132.00
CI	1.47	67	67.00
$2 Breathometer			
CJ	1.47	82	164.00
CK	1.47	35	70.00
CL	1.47	64	128.00
CM	1.47	76	152.00

APPENDIX 8: BAC LEVELS AND DRIVING INTENTIONS OF DRIVERS INTERVIEWED

Table A8.1. Summary of BAC levels and driving intentions for drivers interviewed - VENUES WITH 20 CENT MACHINES ONLY.

	Interviewing before promotion	**Interviewing after promotion**
Number of drivers interviewed	99	65
Number of drivers with BAC>.05	37	21
Proportion of drivers with BAC>.05	0.37	0.32
Number of drivers with BAC>.05 who intended driving or were unsure	30	19
Proportion of drivers with BAC>.05 who intended driving or were unsure	0.81	0.90
Proportion of all drivers interviewed who intended driving and had BAC>.05	0.30	0.29

Table A8.2. Summary of BAC levels and driving intentions for drivers interviewed - VENUES WITH $1 MACHINES ONLY.

Data from one venue which participated in interviewing before but not after promotion are not included.

	Interviewing before promotion	**Interviewing after promotion**
Number of drivers interviewed	155	80
Number of drivers with BAC>.05	28	12
Proportion of drivers with BAC>.05	0.18	0.15
Number of drivers with BAC>.05 who intended driving or were unsure	17	8
Proportion of drivers with BAC>.05 who intended driving or were unsure	0.61	0.67
Proportion of all drivers interviewed who intended driving and had BAC>.05	0.11	0.10

Table A8.3. Summary of BAC levels and driving intentions for drivers interviewed - VENUES WITH $2 MACHINES ONLY.

	Interviewing before promotion	**Interviewing after promotion**
Number of drivers interviewed	292	223
Number of drivers with BAC>.05	65	36
Proportion of drivers with BAC>.05	0.22	0.16
Number of drivers with BAC>.05 who intended driving or were unsure	40	29
Proportion of drivers with BAC>.05 who intended driving or were unsure	0.62	0.81
Proportion of all drivers interviewed who intended driving and had BAC>.05	0.14	0.13

APPENDIX 9: MULTIPLE REGRESSION ANALYSIS OF NUMBERS OF PATRONS AND TESTS

No. tests/day = -0.022 x denomination + 0.00049 x number of patrons

Variable	Coefficient	SE Coefficient	T	Significance of T
Denomination	-0.02218	0.005	-4.40	.001
Patrons	0.00049	0.00032	1.57	.1442

Multiple R	0.805
R Square	0.648
Adjusted R Square	0.584

APPENDIX 10: CHARACTERISTICS OF VENUES

Usage rates of breath testing machines (see Appendix 5 for calculations) were examined according to two characteristics of each venue. The first, presented in Table 1, shows usage rates as a function of the location of the machine. Although there are a limited number of venues with 20c machines, usage rates do not appear to vary according to whether the machine was located in the public bar or in a throughput area. This finding is somewhat similar for $1 machines: usage rates were highest for machines located in the public bar or hall/foyer, but one venue which had the machine located in the public bar had a very low usage rate (EH). Two dollar machines located in halls or foyers appears to be used at a consistent rate of 3 to 5. Machines located in public bars, however, show a variable usage rate (range 0.9 to 12.5). Generally, rates were lowest for machines located gaming rooms or eateries.

Table 10.1: Usage rates for each venue according to machine location

Location of machine	**20c**		**$1**		**$2**	
	Venue	**Usage rate**	**Venue**	**Usage rate**	**Venue**	**Usage rate**
Public bar	EA	8.9	ED	9.4	EJ	0.9
	EB	10.8	EH	0.9	EK	12.5
					EL	4.4
Bistro/gaming room			EG	3.9	EI	1.0
Hall/foyer	EC	8.9	EF	10.5	EM	5.5
					EN	4.5
					EO	3.6

The other venue characteristic to be examined was size of the catchment area. The catchment area is defined as the estimated number of patrons in the room serviced by the breath testing machine, or in the room nearest the machine if it was located in the hall or foyer. The division into small or large catchment areas was based on a median split of the estimated number of patrons in the area (small: <800 patrons; large: >800 patrons). Results are presented in Table 2.

Usage rates again did not vary substantially for venues with 20c machines, regardless of the catchment area size. However, usage rates of $1 machines were higher in venues with small, rather than large, catchment areas. Findings are again less clear for $2 machines as rates are variable both within and between each catchment size.

Table 10.2: Usage rates for each venue according to size of catchment area

Size of catchment area*	20c		$1		$2	
	Venue	Usage rate	Venue	Usage rate	Venue	Usage rate
Small	EB	10.8	ED	9.4	EI	1.0
			EF	10.5	EK	12.5
					EL	4.4
					EM	5.5
Large	EA	8.9	EG	3.9	EJ	0.9
	EC	8.9	EH	0.9	EN	4.5
					EO	3.6

* Estimate of catchment area size based on median split of estimated number of patrons either in, or in close proximity to catchment area (see Table A5.1).