CHANGES IN COMMUNITY PERCEPTIONS RESULTING FROM A BEFORE AND AFTER EVALUATION OF A 'TRAVELSMART' PROJECT IN SOUTH AUSTRALIA

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ABSTRACT

The research this paper presents is from the TravelSmart Households in the West project, which was implemented in Western Adelaide, South Australia by the South Australian Department of Transport, Energy and Infrastructure (SA DTEI). On ground delivery was conducted through a contract with the firm of Steer Davies Gleave (SDG). The project targeted a geographically large and diverse area, comprising 4.5% of the total Adelaide metropolitan area and 13% of its population and engaged 22,101 households to reduce their car use. The primary aim of this project was to reduce transport-related greenhouse gas emissions through travel behaviour.

In this paper, we present a study where before and after surveys were conducted to evaluate to what extent this project impacted the community's perceptions with respect to travel behaviour change, that is, not to evaluate their behaviour change, but to see if the TravelSmart Project impacted their attitudes and beliefs about use of car and alternatives to the car. The before survey was conducted prior to the commencement of TravelSmart in 2005, where 391 respondents participated. In 2007, the same respondents were contacted and an after survey was conducted using the same survey instrument. The results show that in the before survey, inadequate public transport did not get mentioned as one of the most cited disadvantages of reducing car use while in the after survey, public transport has come into the minds of both the TravelSmart participants and the non-participants. Moreover, an analysis of attitudinal statement scales shows that, compared to the 2005 survey, the TravelSmart Project has contributed to some degree of attitude change. Particularly, evidence was found that TravelSmart participants have significantly increased their willingness to reduce car use. We conclude that evidence exists that the TravelSmart project has had the desired effect of changing participants' attitudes towards reducing car use.

INTRODUCTION

The voluntary travel behaviour change (VTBC) interventions, which are often referred to as 'soft' transport policy measures, have been growing rapidly in recent years. Examples of VTBC interventions that have been implemented under various names across the globe, include TravelSmart® in Australia (Ampt, 2003), Travel Feedback Programs in Japan (Taniguchi 2007), IndiMark in the UK (Brög et. al 2009), and Individualised Marketing in EU countries (Jones 2003). The similarities of these tools are that they generally cover a variety of travel demand management approaches which facilitate individuals and households in changing their travel behaviour through personal choice and individual action (Taylor and Ampt, 2003). Research suggests that the benefits of travel behaviour change programmes that can be seen at the community level are substantial and, compared with the costs of infrastructure improvements, they can be achieved at relatively low cost (James and John, 1997; Marinelli and Roth, 2002; Taylor and Ampt, 2003).

The research this paper presents is from the TravelSmart Households in the West project (referred to in this paper as the TravelSmart project), which was implemented in Western Adelaide, South Australia by the South Australian Department of Transport, Energy and Infrastructure (SA DTEI). The project targeted a geographically large and diverse area, comprising 4.5% of the total Adelaide metropolitan area and 13% of its population and engaged 22,101 households to reduce their car use (SA Government, 2009) (see Figure 1). The primary aim of this project was to reduce transport-related greenhouse gas emissions through travel behaviour change, in particular, it aims to allow the engaged TravelSmart residents in a targeted area to make changes to their travel behaviour by reducing vehicle kilometres of travel, increasing use of public transport, walk, and bicycle. A two-component-model for behaviour change was used: a community development approach and an individual conversation-based approach (Government of SA, 2009). In each approach, various tools were provided to address participants' specific needs rather than using a general marketing approach.

The TravelSmart project achieved significant results in reducing car use. Successful outcomes include: savings of over 86 million vehicle kilometres travelled (or 28,000 tonnes of CO_2) across the population of 22,101 households during the project; increases in public transport patronage of more than 6 per cent in the target area since the implementation of the project, while non-targeted regions showed annual growth rates of less than 2 per cent over the same period (SA Government, 2009); from before TravelSmart to about a year after TravelSmart, the engaged households decreased their driving by about 18 percent, while households that were not engaged increased their car use by about 6 percent (Stopher et al., 2007; Stopher et al., 2009). More details about the results of the TravelSmart evaluation can be found in Stopher et al. (2007, 2009). However, the focus of this paper is on whether or not the TravelSmart intervention had any discernible effects on the attitudes and perceptions of TravelSmart participants compared both to non-participants and to attitudes and perceptions before TravelSmart was rolled out.

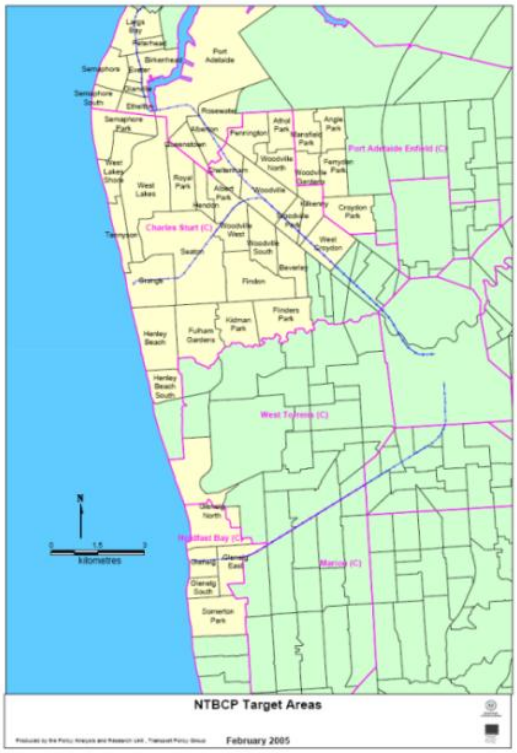

Figure 1: The TravelSmart Households in the West Target area and Evaluation Zone

The Institute of Transport and Logistics Studies (ITLS) was contracted to SA DTEI as an independent evaluator for this project. In 2005, prior to the commencement of the TravelSmart project, ITLS conducted a study named the Community Perceptions of 'TravelSmart' Behaviour in South Australia in the three areas targeted by TravelSmart: Holdfast Bay, Charles Sturt and Port Adelaide-Enfield in Adelaide. The 2005 study aimed to enhance the understanding of the reasons people choose to engage or not engage in sustainable travel behaviour, which includes riding public transport, walking or riding bicycles, in particular, and in identifying the perceived benefits of and barriers to reducing car use among members of this community (Bertoia et al., 2005). The sample for this was drawn at random from the areas that were to be targeted for TravelSmart intervention. It was intended that a representative sample of all residents of the area be obtained. At the time of that study, it was not known which households would and which would not engage in TravelSmart.

In 2007, ITLS went back to the previous respondents and conducted the survey again by using the same survey instrument with as many of the same households as possible to find out to what extent the TravelSmart project had impacted the community's perceptions with respect to travel behaviour change. However, by the time of the second survey, it was known which households participated in TravelSmart and which did not. This also meant that, if a household was no longer available to participate, a replacement household could be recruited from nearby and any replacement households could also be identified as to whether or not they had engaged in the TravelSmart program. At no point, in either survey, were participants told that the study was related to TravelSmart, no mention was made of the TravelSmart program, and identification of households as to whether or not they had

engaged in TravelSmart was undertaken in the office, using records from the original implementation of TravelSmart.

METHODOLOGY

To achieve the same sample size as in the 2005 study, if a household was no longer able to be contacted or was unwilling to participate, thereby requiring replacement recruits, then a new household was recruited from the immediate neighbourhood of the original participant. The following procedure illustrates how the 2007 participants were recruited: an interviewer visited the address of a participant from 2005. If the previous respondent could be located and was willing to participate in this study, an interview was conducted and this respondent was marked as an 'Original'. However, if the previous participant was no longer resident or no longer wanted to participate in the study, an interview was conducted with a current resident from the same address who was eligible, i.e., over 18, owned a car, and was willing to take part. In this case, the respondent was marked as a 'Replacement'. If there were no willing eligible participants from the same address, an interview was conducted with a willing eligible resident of the next house to the right. This respondent was marked as a 'Replacement'. If necessary, the interviewer continued to proceed to the right of the original address, until a willing eligible respondent was found. This strategy was employed because it should provide households with similar demographics, as proved to be the case (see Results section).

The survey instrument, essentially unchanged from the 2005 instrument, consisted of three main sections. Three open-ended questions in the first section asked respondents to indicate the perceived advantages, disadvantages, and barriers to reducing their car use. Section 2 comprised 38 statements for which respondents were asked to state their level of agreement on a 5-point Likert-type rating scale ranging from 'Strongly Agree' to 'Strongly Disagree', with a neutral midpoint. In addition, each statement was supplemented with a 5-point importance scale ranging from 'Not Important' to 'Extremely Important' in order to assess the importance of the underlying perceived benefits and barriers relating to each statement. The third section contained demographic questions[1].

RESULTS

Demographic Comparisons Between 2005 and 2007

To determine if the respondents in the 2005 and 2007 survey are similar, we conducted a demographic comparison between the 2005 and 2007 respondents. Specifically, the demographic make-up of replacements were compared to the people they replaced and statistical tests were employed to determine whether the differences between these two groups were statistically significant. A two-tailed t-test was used to compare the numerical values, such as number of children, number of workers, and age, while a Chi-square test

[1] The detailed survey instrument can be found in Zhang and Stopher, 2008.

was used to compare the differences on categorical variables, such as gender, types of driving license, and occupational status. Table 1 shows the results of the t-tests, with the mean, variance, standard deviation and p value listed for both Replacements and Originals[2]. In the part of the Table labelled 'Replacements', the 2005 households are those who were included in 2005 but were not available in 2007, while the 2007 households are those that were recruited as replacements in 2007. Table 2 shows the results of the Chi-square tests, where the p value for each categorical variable is listed. In both the tests, we assume statistical significance if differences are detected at the $p<0.05$ level.

Tables 1 and 2 show that none of the demographic differences between the 2005 and 2007 surveys are statistically significant, except for the *Highest Educational Level* variable. This is expected, because the time difference between the two surveys means that those respondents who were in education at the time of the before survey will have advanced by three years by the after survey. Furthermore, the difference is similar for the replacements and the original respondents, further suggesting that the replacements are representative of the households that they replaced. Therefore, we may conclude that there is no indication that those participants marked as replacements in the 2007 survey are significantly different from those that they replaced from the 2005 survey. Therefore, we can compare the participants in the 2005 survey to those in the 2007 survey without separating originals from replacements.

Table 1: Statistical Testing for Demographic Comparison Between 2005 and 2007 (Numerical Variables)

Source	***Replacements***						***Originals***					
	Mean		***Standard deviation***		***t-test***		***Mean***		***Standard deviation***		***t-test***	
	2005	***2007***	***2005***	***2007***	***t***	***p-value***	***2005***	***2007***	***2005***	***2007***	***t***	***p-value***
Age	49.15	50.27	18.83	18.99	0.61	0.54	55.87	54.85	16.78	16.79	0.56	0.58
Residency Length	14.91	14.81	14.52	15.64	1.80	0.07	21.42	22.12	16.53	17.11	0.70	0.38
Number of Adults	1.94	2.07	0.06	0.07	1.45	0.15	1.96	1.94	0.80	0.79	0.20	0.84
Number of Children	0.59	0.51	0.07	0.07	0.86	0.39	0.56	0.51	0.89	0.85	0.50	0.62
Number of Persons	2.54	2.58	1.35	1.45	0.33	0.74	2.52	2.46	1.24	1.18	0.44	0.66
Number of Workers	1.29	1.27	0.07	0.08	0.22	0.83	1.08	1.10	1.14	1.13	0.24	0.81
Number of Vehicles	1.74	1.72	0.06	0.06	0.23	0.82	1.75	1.74	0.87	0.92	0.92	0.11
Number of Bicycles	1.16	1.16	0.10	0.10	0.01	1.00	1.26	1.35	1.50	1.58	0.56	0.58

[2] Because the two surveys were nearly three years apart, the age variable and the residency length variable were adjusted accordingly.

Number of Drivers	1.79	1.84	0.81	0.91	0.63	0.53	1.81	1.83	0.80	0.75	0.14	0.89

Table 2: Statistical Testing for Demographic Comparison Between 2005 and 2007 in terms of Replacements (Categorical Variables)

Source	***Chi-Square Test: p-value***					
	Gender	***Household Ownership***	***Physical Limitation***	***Driver's License***	***Highest Educational Level***	***Occupational Status***
Originals	0.76	0.80	0.05	0.14	0.01*	0.08
Replacements	0.79	0.06	0.05	0.05	0.00*	0.08

*Statistically significant value

TravelSmart : Participants versus Non-participants

In the 2007 survey, 172 participants were from the original survey and 219 participants were replacements. The detailed selection procedure for replacements was described in the methodology section previously. Within each group, we also identified their TravelSmart participation status as being one of three categories: participants, non-participants, and not applicable (n/a). Respondents were identified as not applicable if their address was missing from the TravelSmart database or if their residency length was less than one year[3]. We also found that the driving license status of some participants changed between the two surveys, due, for example, to a physical limitation. Because the purpose of this study is to study people's behaviour about reducing car use, we decided to study only those respondents with a valid driving license when both surveys were implemented. Table 3 shows the distribution of participants and non-participants for the surveys after removing respondents who did not have a valid driving license. It should also be recalled that, in the 2005 survey, no one was yet a participant, because the TravelSmart project had not yet begun. Classification into participants and non-participants was done well after the survey was completed and the TravelSmart project had also been completed.

Table 3: Participants and Non-Participants in the 2007 and the 2005 Surveys

Group	***2007***			***2005****		
	Originals	***Replacements***	***Total***	***Originals***	***Replacements***	***Total***
Participants	79	55	134	81	49	130
Non-Participants	66	89	155	70	121	191
Not Applicable	21	65	86	21	46	67

Open-ended Questions

Tables 4, 5 and 6 present the results of each of the 'open-ended' questions, which are advantages, disadvantages, and barriers to reducing car use.

Table 4: Perceived Advantages of Reducing Car Use Cited by Participants and Non-Participants in 2005 and 2007

Participants 2005 (N=130)			***Participants 2007 (N=134)***		
Advantages	**Frequency**	**%**	**Advantages**	**Frequency**	**%**
Money Saving	80	61.5%	Money Saving	59	44.0%

[3] The reason for the latter is that, because the TravelSmart project started in 2005 and ended in late 2006, we could not be sure if the resident who had lived at their current address for less than a year was the same one that was approached for the TravelSmart project.

Petrol Saving	67	51.5%	Petrol Saving	56	41.8%
Environmental Benefits	33	25.4%	Environmental Benefits	46	34.3%
None	31	23.9%	Exercise	37	27.6%
Exercise	29	22.3%	None	33	24.6%
Non-Participants 2005 (N=191)			***Non-Participants 2007 (N=155)***		
Advantages	**Frequency**	**%**	**Advantages**	**Frequency**	**%**
Money Saving	132	69.1%	Petrol Saving	74	47.7%
Petrol Saving	112	58.6%	Money Saving	64	41.3%
Environmental Benefits	54	28.3%	None	45	29.0%
None	44	23.0%	Environmental Benefits	45	29.4%
Exercise	42	22.0%	Exercise	41	26.5%

Table 5: Perceived Disadvantages of Reducing Car Use Cited by Participants and Non-Participants in 2005 and 2007

Participants 2005 (N=130)			***Participants 2007 (N=134)***		
Disadvantages	**Frequency**	**%**	**Disadvantages**	**Frequency**	**%**
Time Taken	43	33.1%	Inconvenience	44	32.8%
Inconvenience	32	24.6%	Time Taken	43	32.1%
Lack of Connectivity	25	19.2%	Carrying Loads	17	12.7%
Work	19	14.6%	Inadequate Public Transport	17	12.7%
Carrying Loads	17	13.1%	Flexibility	16	11.9%
Non-Participants 2005 (N=191)			***Non-Participants 2007 (N=155)***		
Disadvantages	**Frequency**	**%**	**Disadvantages**	**Frequency**	**%**
Time Taken	58	30.4%	Inconvenience	55	35.5%
Inconvenience	47	24.6%	Time Taken	46	29.7%
Work	46	24.1%	Inadequate Public Transport	24	15.5%
Carrying Loads	29	15.2%	Carrying Loads	21	13.6%
Lack of Connectivity	22	11.5%	Work	13	8.4%

Table 6: Perceived Barriers of Reducing Car Use cited by Participants and Non-Participants in 2005 and 2007

Participants 2005 (N=130)			***Participants 2007 (N=134)***		
Barriers	**Frequency**	**%**	**Barriers**	**Frequency**	**%**
Inconvenience	30	23.1%	Time Taken	26	19.4%
Work	30	23.1%	Carrying Loads	22	16.4%
Lack of Connectivity	27	20.8%	Inconvenience	21	15.7%
Time Taken	22	16.9%	Inadequate Public Transport	20	14.9%
Children	19	14.6%	Family	20	14.9%
Non-Participants 2005 (N=191)			***Non-Participants 2007 (N=155)***		
Barriers	**Frequency**	**%**	**Barriers**	**Frequency**	**%**
Time Taken	53	27.8%	Time Taken	27	17.4%
Work	49	25.7%	Family	25	16.1%
Lack of Connectivity	30	15.7%	Carrying Loads	25	16.1%
Inconvenience	27	14.1%	Transport Others	24	15.5%
Children	24	12.6%	Inconvenience	22	14.9%

From these tables, it is important to note that the most prominent perceived advantages and disadvantages of, and barriers to, reducing car use cited by participants and non-participants are remarkably similar to each other. This suggests that all participants' main concerns

regarding reducing car-use are relatively the same. Tables 5 and 6 show that increased travel time and inconvenience are clearly the most prominent perceived disadvantages and barriers for both participants and non-participants. Tables 4, 5, and 6 also show that there were no substantial differences in perceptions and barriers prior to TravelSmart between those who eventually became TravelSmart participants and those who did not. In other words, we may conclude from here that it was not a case that those who saw lesser barriers to decreasing car use, or those who perceived disadvantages to car use more clearly, or those who saw greater advantages in car use were more likely to have then engaged in the TravelSmart program. However, Table 4 shows that both participants and non-participants surveyed in 2005 placed a stronger emphasis on money and petrol savings, while in 2007 the results are more evenly spread across all advantages. Furthermore, Table 5 shows that in the 2005 survey, inadequate public transport did not get mentioned as one of the most cited disadvantages of reducing car use while in 2007, public transport has come into the minds of both participants and non-participants.

It is interesting to note that participants and non-participants have some quite different patterns in terms of the changes from the 2005 survey to the 2007 survey. For example, Table 4 shows an approximate nine percent increase from 2005 to 2007 for participants citing *Environmental Benefits*, while for non-participants this only increased by one percent. *No Perceived Advantages* remains hardly changed for participants from 2005 to 2007, while a six percent increase was observed for non-participants.

Analysis of Selected Travel Behaviours

In this section, we selected four specific travel statements in the survey for further analysis: *Local Shops and Service*, *Car Pooling*, *Trip-chaining* and *Potential Car Sharing*. These specific statements were measured by the respondents' level of agreement and importance with four statements (Table 7).

Table 7: Selected Specific Statements For Further Analysis

	Statement	***Agreement***	***Importance***
1	Local shops and service	You can meet some of your everyday needs by using local shops and services	The availability and existence of local shops and services
2	Car pooling	You would not consider car pooling	Car pooling
3	Trip chaining	You cannot see the benefits of using your car to do several things before returning home	Using your car to do several things before returning home
4	(Potential) Car Sharing	You could use your car less if you sometimes travelled with others	Your ability to share car travel with others

Tables 8 and 9 show the attitude changes of both the participants and the non-participants towards these four statements in terms of all respondents. The standard error and 95 percent confidence range of these changes can be found in Table 10.

From Tables 8-10, we can see that both participants and non-participants have significantly increased the importance level for *Local Shops and Services*, *Car Pooling* and *Potential Car Sharing* (asterisked in Table 9). This indicates that all respondents have seen the statements comprising *Local Shops and Services*, *Car Pooling* and *Potential Car*, more important than

before the TravelSmart intervention. However, we cannot tell by this stage whether these changes were caused by the TravelSmart project, because both participants and non-participants have shown a similar level of change. The only difference between participants and non-participants, as shown in Table 9, is that participants exhibited a significant increase on how important trip chaining is while non-participants were not observed to have such an increase. Thus, we can infer that TravelSmart had some impact on people's importance for trip chaining behaviour.

Table 8: Comparisons of the Average Agreement Values for Selected Statements Between 2005 and 2007

		Participants			***Non-Participants***		
		2005	***2007***	***2005-07***	***2005***	***2007***	***2005-07***
1	Local shops and services	3.863	3.944	0.081	3.788	3.877	0.089
2	Car pooling	2.877	2.803	-0.074	2.720	2.741	0.021
3	Trip chaining	1.985	2.092	0.107	2.068	2.080	0.012
4	(Potential) Car Sharing	3.229	3.408	0.179	3.275	3.235	-0.040

Table 9: Comparisons of the Average Importance Values for Selected Statements Between 2005 and 2007

		Participants			***Non-Participants***		
		2005	***2007***	***2005-07***	***2005***	***2007***	***2005-07***
1	Local shops and services	3.608	3.901	0.294*	3.301	3.607	0.307*
2	Car pooling	1.677	2.042	0.365*	1.771	2.031	0.260*
3	Trip chaining	3.649	3.965	0.316*	3.658	3.853	0.195
4	(Potential) Car Sharing	2.237	2.676	0.439*	2.036	2.503	0.467*

*Statistically significant value

Table 10: Sampling Error and 95 Percent Confidence Limits on the Average Agreement and Importance Changes Between 2005 and 2007

Behaviour	***Sampling Error***				***95 Percent Confidence Limits***			
	Participants		***Non-Participants***		***Participants***		***Non-Participants***	
	Agreement	***Importance***	***Agreement***	***Importance***	***Agreement***	***Importance***	***Agreement***	***Importance***
1	0.117	0.115	0.101	0.120	±0.230	±0.226	±0.197	±0.235
2	0.151	0.142	0.124	0.129	±0.297	±0.278	±0.244	±0.252
3	0.110	0.121	0.109	0.103	±0.216	±0.238	±0.213	±0.202
4	0.120	0.144	0.117	0.121	±0.235	±0.282	±0.230	±0.238

Factor Analysis

To identify the impact of TravelSmart on people's attitude changes towards reducing car use, we conducted factor analysis for participants and non-participants using the following procedure. First, the factor analysis was run within thirty eight agreement variables in the 2005 data to identify factors where Eigen values[4] were 0.45 or more. Second, factor scores

[4] The Eigen value is also called the characteristic root, which, for a given factor, measures the variance in all the variables which is accounted for by that factor.

were calculated for each participant based on the factor coefficients within each factor. Third, the factor coefficients were applied to the thirty eight importance variables in the 2005 sample, the agreement variables in the 2007 sample and the importance variables in the 2007 sample.

The analysis of the 2005 survey data showed that there were five main factors within the thirty-eight agreement variables (Table 11). The first factor comprised questions relating to *Convenience of Car Use*, the second is related to *Unwillingness to Reduce Car Use*, the third is related to *Disbenefits of Car Use Compared with Other Ways of Travelling*, the fourth is *Willingness to Reduce Car Use* and the last one is *Negative Feelings about Car Use*. In relation to the first factor, for example, we can notice that this factor was composed of four agreement variables: *Rely on cars to carry things*, *Rely on cars because of living too far*, *Allow you to travel directly from A to B*, and *Allow you to save time*. Table 11 shows that thirteen variables have been covered in the five factors[5]. In terms of agreement and importance responses, the comparisons of the average factor scores in each factor with the 2005 and 2007 surveys are shown in Table 12. It is interesting to note that in Tables 11 and 12, while most of the attitude changes made by participants and non-participants are in the same direction, the size of the changes are quite different. For instance, for factor 2, participants had a greater level of decrease in relation to agreeing with *Unwillingness to Reduce Car* than non- participants. In other words, more participants expressed willingness to reduce car use.

Table 11: Factor Analysis Results

Factor No.	***Factor Summary***	***Variables***	***Factor Loading****
Factor 1	Convenience of Car Use	Rely on cars to carry things	0.726
		Rely on cars because of living too far	0.664
		Allow you to travel directly from A to B	0.622
		Allow you to save time	0.452
Factor 2	Unwillingness to Reduce Car Use	You have taken steps to reduce the car use	-0.763
		You are not willing to make a commitment to reduce your car use	0.667
		There is no way you can rely on your car less	0.469
		You cannot see benefits of using cars to do several things before returning home.	0.457
Factor 3	Disbenefits of Car Use Compared with Other Ways of Travelling	Driving is not more convenient than walk, bicycle, or public transport	0.734
		Driving cars does not allow you to be independent	0.669
		Car travel does not offer more flexibility than walk, bicycle, or public transport	0.662
Factor 4	Willingness to Reduce Car Use	Willing to reduce your car use even if it means reducing your comfort level	0.622
		Your family and friends would support you reducing your car use	0.598
		Unhappy with yourself for not doing more to help to protect the environment	0.570
		You can see the benefits of making small changes to use your car less	0.470
Factor 5	Negative Feelings about Car Use	Fear of accident	0.706
		Driving does not make you stressed	-0.631
		You don't enjoy driving	0.602

*The factor loading cut-off for statistical significance at a=0.05 is 0.45

Table 12: Comparisons of the Average Factor Score Differences with 95 Percent Confidence Limits Between 2005 and 2007

Factor No.	***Agreement***							
	Participants				***Non-participants***			
	2005	***2007***	***2005-07***	***95% confidence limits***	***2005***	***2007***	***2005-07***	***95% confidence limits***
1	5.925	5.931	0.006	±0.233	6.094	5.959	-0.135	±0.212

[5] The factor loadings of the remaining variables are too low to be included.

2	1.660	1.275	-0.385*	±0.270	1.616	1.409	-0.207	±0.230
3	2.160	2.411	0.252*	±0.240	2.141	2.388	0.247*	±0.222
4	3.418	3.374	-0.044	±0.276	3.536	3.372	-0.164	±0.196
5	-0.282	-0.364	-0.082	±0.280	-0.330	-0.304	0.026	±0.231
Factor No.	***Importance***							
	Participants				***Non-participants***			
	2005	***2007***	***2005-07***	***95% confidence limits***	***2005***	***2007***	***2005-07***	***95% confidence limits***
1	5.433	5.602	0.169	±0.284	5.550	5.664	0.113	±0.240
2	1.945	1.971	0.025	±0.166	1.922	2.001	0.079	±0.166
3	4.199	4.325	0.126	±0.233	4.278	4.314	0.036	±0.180
4	3.960	4.087	0.126	±0.259	3.973	4.261	0.289*	±0.193
5	0.377	0.446	0.068	±0.206	0.427	0.516	0.089	±0.186

*Statistically significant value

Table 12 shows the various differences in average factor scores with 95 percent confidence limits between 2005 and 2007. When the change is larger than the corresponding 95 percent value, we consider it to be statistically significant. Four changes are statistically significant, all of which are marked with an asterisk in Table 12. The first significant change is that agreement by TravelSmart participants with factor 2 -- *Unwillingness to Reduce Car Use* -- has decreased significantly. Agreement on this factor has decreased for non-participants, but, not significantly, nor by as much numerically. This suggests that participants are significantly more willing to reduce car use than non-participants after the implementation of TravelSmart. For both participants and non-participants, agreement with factor 3--*Disbenefits of Car Use Compared with Other Ways of Travelling* has increased significantly. The increase is almost the same in each case, suggesting that other reasons than TravelSmart have caused the changes in this factor, although we cannot rule out TravelSmart as a change factor. In terms of the importance variables, there are no statistically significant values identified for participants, but for non-participants, the perceived importance of *Willingness to Reduce Car Use* has increased significantly. Because the importance variables were designed to assess the importance of the underlying perceived benefits and barriers relating to the agreement measurement, this significant change identified for non-participants again suggests that other reasons than TravelSmart have led people to strengthen the importance of the awareness of reducing car use. It should be noted that the participants also showed an increasing level of agreement on this factor, although the change was numerically smaller and not statistically significant. These changes could indicate that other effects, such as increasing petrol prices, have increased awareness of the potential to reduce car use, although this has happened less for participants who may already have reduced their car use.

CONCLUSIONS

This study contributes to the travel behaviour change research by comparing the changes between a before and after study of community perception to advance our understanding of the effects of the wider TravelSmart programme in reducing care use.

The contribution of the study is, first, the study successfully demonstrates that the before and after self-report survey method is a powerful tool to assess the attitudinal and behaviour changes in terms of certain transport policy interventions. Furthermore, the results of the

demographic analysis in the before and after survey indicates that the method for replacing the attrition in the after survey is effective and could be considered for other similar studies in the future. Secondly, the results themselves have shown some interesting insights of the extent to which TravelSmart has affected people's behaviour and attitudinal changes towards reducing car use. These results include that, in the before survey, inadequate public transport was not mentioned as one of the most cited disadvantages of reducing car use while in the after survey, public transport has come into the minds of both the TravelSmart participants and the non-participants. Moreover, an analysis of attitudinal statement scales shows that, compared to the 2005 survey, the TravelSmart project has contributed to some degree of attitude change, for example, participants have significantly increased their willingness to reduce car use. As was stated in the beginning of this paper, strong evidence was found that TravelSmart has a positive effect in changing behaviour into more environmentally friendly travel modes, such as public transport, walking or cycling. Therefore, these results further show evidence to suggest that this TravelSmart project has had the desired effect of changing participants' attitudes towards reducing car use. This is a highly significant result, because if attitudes are changed as well as behaviours, there is a much greater likelihood that the behaviour changes will be sustained. If behaviour changes had occurred without any attitude changes, then it could be expected that behaviours would fairly rapidly return to what they were prior to the implementation of the TravelSmart project.

Although in some instances it is difficult to infer that TravelSmart was the cause of the changes and that other personal influences or reasons may have caused some of the changes, it is also noteworthy that self-reporting of changes in travel behaviour appears to be highly suspect. Further in-depth analysis is still required to explore the factors differentiating groups of participants who changed their behaviour to more environmentally friendly behaviours after the TravelSmart intervention. Sorting out exactly what led some to change their perceptions apart from the TravelSmart intervention is more difficult to address, however. It is quite likely that this cannot be clearly ascertained, because the questioning likely to be necessary may, of itself, influence the perceptions and attitudes that it is desired to measure. Of course, over the duration of this study, there were various other things happening, such as short-term rises and declines in petrol prices, increasing global attention to climate change, political changes within Australia that may have influenced people's attitudes about car use, and so forth. To some extent, these 'environmental' changes must be expected to have influenced the perceptions and attitudes of both TravelSmart participants and non-participants.

REFERENCES

Ampt, E. (2003). Understanding Voluntary Travel Behaviour Change. Paper presented at the 26th Australasian Transport Research Forum, Wellington, New Zealand, October 2003.

Bertoia T.; Tideman, J.; Stopher, P. (2005). Community Perceptions of 'TravelSmart' Behaviour in South Australia. report prepared by the Institute of Transport and Logistics Studies for the Department of Transport and Urban Planning, Adelaide, South Australia.

IEAust (1996). Policy on Travel Demand Management. Institution of Engineers, Australia, Canberra.

Marinelli, P. A.; Roth, M.T. (2002). TravelSmart Suburbs Brisbane-a successful pilot of voluntary travel behaviour change technique. Paper presented at the 25th Australasian Transport Research Forum, Canberra, Australia. October, 2002.

James, B.; John, G.(1997). Behavioural approaches to travel demand management. Papers presented at 21st Australasian Transport Research Forum, Adelaide, Australia. September, 1997.

Red3 (2005). Evaluation of Australian TravelSmart Projects in the ACT, South Australia, Queensland, Victoria and Western Australia: 2001–2005. Report to the Department of Environment and Heritage and State TravelSmart Program Managers. Accessed on 31/08/2009 from: http://www.travelsmart.gov.au/publications/evaluation-2005.html

SA Government. (2009). TravelSmart Households in the West project report. SA Department for Transport Energy and Infrastructure. Access on 25/06/09 from:http://www.transport.sa.gov.au/pdfs/environment/travelsmart_sa/Households_in_the_West_Final_Report.pdf

Stopher, P. (2004). Voluntary Travel Behaviour Change, in D. Hensher and K. Button (editors), Handbook on Transport Strategy, Policy, and Institutions, Elsevier (Handbook No.6), pp. 561-579.

Stopher P.; Clifford, E.; Zhang, Y.; Swann, N. (2007). Independent Evaluation of TravelSmart Households in the West Voluntary Travel Behaviour Change program. Report prepared by the Institute of Transport and Logistics Studies for South Australian Department of Transport, Energy and Infrastructure.

Stopher, P.; Zhang, Y.; Halling, B. (2009). Results of an Evaluation of TravelSmart in South Australia. Paper presented to the 32nd Australasian Transport Research Forum, Auckland, New Zealand. September, 2009.

Taylor, M.; Ampt, E. (2003). Travelling Smarter Down Under: Policies for Voluntary Travel Behaviour Change in Australia. *Transport Policy*, 10 (3), pp 265-177.

Travelsmart SA (2006). Why is TravelSmart important, SA Department for Transport Energy and Infrastructure, Access on 31/08/09, http://www.transport.sa.gov.au/environment/travelsmartsa/about.asp

Zhang, Y.; Stopher, P. (2008). A Community Perception After Survey. Report prepared by the Institute of Transport and Logistics Studies for South Australian Department of Transport, Energy and Infrastructure.