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Community Perceptions of
'TravelSmart' Behaviour in
South Australia

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ABSTRACT: Insights from psychology and marketing have recently led to an alternative to information-based behaviour change campaigns, known as community-based social marketing. The key to this approach is the identification of barriers that prevent individuals from engaging in sustainable behaviours, and the implementation of strategies ('tools') specifically targeted at addressing these perceived barriers. The aim of the current study was to contribute to travel behaviour change research by enhancing our understanding of the reasons people choose to engage or not engage in reducing car use. Face-to-face interviews were conducted on a sample of 392 individuals from the western Adelaide metropolitan region. The survey instrument utilised various questioning techniques such as open-ended questions, agreement scales (to attitudinal statements), and importance scales, to identify the perceived benefits and barriers to reducing car use among members of this community. The survey was conducted prior to the commencement of the TravelSmart intervention in the western suburbs of the Adelaide metropolitan region. The survey identified 'convenience' and the importance of 'making small changes' as the dominant factors distinguishing those who identify themselves as actively trying to reduce their car use from those who are not currently active in this behaviour. The results obtained from this study suggest the existence of key differences in the priorities of people who are currently active and currently inactive in reducing car use.

KEY WORDS: *TravelSmart, travel behaviour change, community-based social marketing, barriers.*

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1. Introduction

One of the key issues facing modern growing cities worldwide, as we enter an era of increasing concern over dwindling resources and environmental degradation, is whether urban populations are engaged in lifestyles amenable to sustainable living. Of particular importance to the question of sustainable living is the changing nature of travel behaviour, with an increasing dependence on the automobile.

Recently, travel behaviour has become an increasingly important topic of interest, not only to transport researchers, but also to behaviour change researchers, particularly from the psychology field (e.g., Garvill, 1999). Despite this recent interest in changing community travel behaviours to promote sustainability, most of the travel behaviour change research to date has centred on a variety of health and safety issues, including bicycle helmet promotion programs (e.g., Farley, Otis & Benoit, 1997), seat belt promotion programs (e.g., Cox, Cox & Cox, 2000), and pedestrian safety programs (e.g., Boyce & Geller, 2000).

One of the most promising contributions to travel behaviour change research in recent times has emerged in the form of community-based social marketing (McKenzie-Mohr & Smith, 1999; McKenzie-Mohr, 2000), an alternative to information-based behaviour change campaigns. The key to McKenzie-Mohr's approach is the identification of barriers that prevent individuals from engaging in sustainable behaviours, and the implementation of strategies ('tools') specifically targeted at addressing these perceived barriers. The advantage of this approach is that it enables behaviour change program designers to have a more detailed idea of the issues that individuals perceive to be the most important reasons for not engaging in certain specific behaviours. The recommended method for achieving this aim is to compare the frequency and strength of the perceived barriers to change from a group of individuals who are currently engaged in, and those not currently engaged in, the behaviour of interest.

The primary aim of the current study is to contribute to travel behaviour change research by enhancing our understanding of the reasons people choose to engage or not engage in sustainable travel behaviours, such as riding public transport, walking, or riding bicycles. A secondary aim of the current study is to inform the design and implementation of behaviour change programs and to enable a more strategic approach to travel behaviour change with particular reference to addressing the often specific concerns of the target community involved.

1.1 Potential barriers to travel behaviour change

A number of potentially important barriers to behaviour change have been identified in environmental research. McKenzie-Mohr (2000) distinguishes between internal barriers (such as psychological barriers relating to perceptions and attitudes) and external barriers (relating to structural and environmental variables beyond the control of the individual). For the purposes of this study, we focus on internal barriers where possible, with a caveat that the existence of significant external barriers, such as inadequate transport infrastructure, will inevitably undermine any efforts to address internal barriers, thus potentially leading to the failure of behaviour change programs (McKenzie-Mohr, 2000).

A number of potentially important barriers to travel behaviour change have been identified in other behaviour change literature (see Hines, Hungerford & Tomera, 1987, for a meta-analysis of the predictors of a variety of responsible environmental behaviours). One of the most important barriers identified by Hines et al. (1987) is a lack of ongoing commitment to the behavioural change of interest. McKenzie-Mohr (2000) emphasises the need to address this barrier by gaining some form of commitment from the individual to agree to engage in the activity. There is also the issue of the 'foot-in-the-door' effect, which suggests that gaining a commitment to a small behavioural change is more likely to lead to more substantial behavioural change in future (see Katsev & Wang, 1994, for a review of the commitment literature).

Another major theme in the sustainable behaviour change literature is the importance of an internal locus of control, also known variably as perceived behavioural control and perceived consumer effectiveness. This concept relates to the individual's belief that an individual acting alone can make a difference. Walton, Thomas & Dravitzki (2004) explored this concept in their study using attitudinal statements, finding that futility (i.e., a belief that an individual cannot make a difference) was a common rationalisation of the attitude-behaviour inconsistency often displayed by individuals not engaged in sustainable behaviours.

A number of other potential barriers to travel behaviour change can be identified from behaviour change research in other fields, such as health, education, and road safety and awareness programs. The most common barriers include safety concerns, lifestyle, enjoyment of driving, comfort, habits, prestige of car use, connectivity, reliability, travel time, convenience, location, flexibility, social support, and lack of information about alternatives. It is important to note that research generally does not support the assumption that responsible environmental behaviours are predicted by a common set of psychological and non-psychological variables (e.g., Tracy & Oskamp, 1984). Instead, as McKenzie-Mohr et al. (1995) claim, it is more likely that different behaviours are predicted by a separate set of variables. In other words, it is important to investigate the specific variables predicting specific behaviours, and not to assume that what may affect one behaviour (e.g., car-pooling) will also affect another behaviour (e.g., trip-chaining). The aim of this study is thus to investigate the specific perceived benefits and barriers of behaviours relevant to a variety of sustainable car-use behaviours (e.g., trip-chaining and car-pooling) among an adult population in Adelaide, South Australia.

2. Method

2.1 Survey instrument development

The survey instrument was developed in several stages. The first stage involved a literature search identifying potential barriers to reducing car use. Information was obtained from the PsycInfo database as well as searches on the Google Scholar web search engine (<http://scholar.google.com/>) and recommended transportation articles from McKenzie-Mohr's website (www.cbsm.com). In addition, four independent contributors identified potential benefits and barriers to reducing car use based on their own experiences. Once all of the information was collated, a final list of 30 benefits and barriers was obtained, from which attitudinal statements were constructed. Each statement was supplemented with a 5-point Likert-type agreement 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.

In addition to the attitudinal questions, a series of open-ended questions were created with the purpose of investigating the perceived advantages, disadvantages and barriers to reducing car use in three different scenarios (general car use reduction, trip-chaining, and car-sharing).

2.2 Pilot study

A pilot study was conducted to test the operation of the survey and to provide an estimate of the time taken to complete this survey. A face-to-face pilot study was conducted on a random sample of 25 households in the target area of the "TravelSmart Households in the West" project (in the western suburbs of the Adelaide metropolitan region), using both open-ended questions and attitudinal statements. The open-ended questions and demographic information were obtained verbally by the interviewer, whereas the responses to the attitudinal statements were written by respondents in a short paper-and-pencil questionnaire.

The pilot study provided valuable information with respect to the running of the survey and the importance of the perceived travel issues (benefits and barriers). Due to the excessive time taken to complete the surveys (average of approximately 25 minutes), it was decided to reduce significantly the content of the survey and to distribute the attitudinal questions over two sections: one requiring respondents to state their level of agreement with the statements, and another section requiring respondents to indicate how important each explicitly stated issue is to them when making travel decisions. Additionally, section 1 (comprising the open-ended questions) was significantly reduced to include only questions asking respondents to indicate the perceived advantages, disadvantages, and barriers to reducing car use in general. Some statements were removed from the questionnaire for the main study based on analysis of the pilot study data that revealed that some issues were not important in respondents' travel decision-making, while new statements were included in the main study as a result of responses to the open-ended questions from the pilot study.

2.3 Main study

2.3.1 Survey instrument

The survey instrument for the main study consisted of four main sections. The first section comprised three open-ended questions asking respondents to indicate the perceived advantages, disadvantages, and barriers to reducing their car use. The second section consisted of 38 statements requiring respondents to state their level of agreement on a 5-point Likert-type rating scale (1 = 'Strongly Disagree', 2 = 'Disagree', 3 = 'Neither Agree Nor Disagree', 4 = 'Agree', 5 = 'Strongly Agree'). Section 3 of the survey interview consisted of respondents rating the importance of 38 issues (presented in the same order as their corresponding statements in Section 2) on a 5-point

importance scale (1 = 'Not Important', 2 = 'Somewhat Important', 3 = 'Important', 4 = 'Very Important', 5 = 'Extremely Important'). The final section of the survey interview consisted of demographic information, including current employment status and highest education level.

2.3.2 Participants

An initial sample of 700 randomly-drawn households in the target area of the "TravelSmart Households in the West" project were sent pre-notification letters. These letters informed them that they may be approached by an interviewer from Taverner Research Company to conduct a short face-to-face interview with them regarding travel issues in Adelaide.

2.3.3 Procedure

The survey was conducted prior to the commencement of the TravelSmart intervention in the western suburbs of the Adelaide metropolitan region. In addition to the initial sample of 700 households it was determined that, should the response rate be inadequate in the initial stages of the survey, and in order to reduce the costs of running the survey due to unnecessary interviewer travel, steps were to be taken to ensure that a replacement sample was created. It was determined that an attempt to recruit a replacement household would be carried out if a household from the initial sample had been contacted 3 times. After the third attempted contact, the interviewer attempted to recruit the next household immediately clockwise (or the next household increasing in number by 1 along the same street) relative to the initial household. In the case of a household situated in a block of units, the interviewer attempted to contact the unit immediately next to (and increasing in unit number by 1) the initial household. On receipt of consent to proceed with the interview, the interviewer verbally asked all questions in the interview, using display cards to cue respondents as to the appropriate rating scale to be used in sections 2 and 3.

3. Results

3.1 Recruitment

Table 1 provides the recruitment rate details, organised separately by initial household and replacement household sample. Three hundred and ninety-two households were recruited, 273 from the initial sample and 119 from the replacement sample. One questionnaire was misplaced, thus yielding a final sample of 391 households.

Table 1: Recruitment information for initial and replacement sample

Category	Level of category	Initial sample	Percent of initial sample	Replacement sample
Total interviews		273	39.00%	119
	1st call	139	19.86%	49
	2nd call	82	11.71%	45
	3rd call	52	7.43%	25
Refusals		45	6.43%	87
	Explicit refusals	32	4.57%	80
	Questions not answered	13	1.86%	7
Ineligible		103	14.71%	110
	Foreign	10	1.43%	6
	No car	65	9.29%	81
	Retail shops	2	0.29%	1
	Nursing home	1	0.14%	0
	Vacant block/house	25	3.57%	22
Eligibility unknown		279	39.86%	154
	Out	214	30.57%	103
	Locked gate/dog	15	2.14%	33
	Security access	2	0.29%	5
	Call back	47	6.71%	11
	Sick	1	0.14%	2
Total households		700	100.00%	470

3.2 Demographic information

Table 2 displays basic demographic statistics for the specified target areas in Adelaide. The specified target areas are as follows: West Lakes (a composite of ABS suburbs Ethelton, Semaphore Park, West Lakes Shore, West Lakes, Royal Park, Queenstown, Hendon, Tennyson and Seaton); Kilkeny (a composite of ABS suburbs Beverley, Croydon Park, Ferryden Park, Kilkeny, West Croydon, Woodville, Woodville Gardens, Woodville North, Woodville Park and Woodville South); Henley Beach (a composite of ABS suburbs Fulham, Fulham Gardens, Grange, Henley Beach, Henley Beach South, Lockleys and West Beach); and Glenelg (a composite of ABS suburbs Glenelg, Glenelg East, Glenelg North, Glenelg South, Glengowrie, Novar Gardens and Somerton Park). Table 3 displays the frequency distributions while Table 4 displays the descriptive statistics for demographic variables in the main study. All the demographic information reported in Tables 3 and 4 is based on 391 completed questionnaires in the main study.

Table 2: Some Basic Demographic Statistics for the Specified Target Areas

Statistic	Adelaide SD	West Lakes	Kilkenny	Henley Beach	Glenelg
Area (km ²)	1826.9	18.2	13.5	17	13.4
Total Population	1,072,585	31,149	23,119	33,747	26,683
Population Density (persons per km ²)	587.11	1,711	1,712.52	1,985.12	1,991.27
Total number of households	420,045	12,978	9,286	13,628	11,872
Average household size	2.4	2.3	2.4	2.4	2.0
Median weekly household income	\$600-\$699	\$600-\$699	\$500-\$599	\$700-\$799	\$600-\$699
Median age	37	42	37	41	43
Percentage of persons 14 years and younger	18.8	15.9	18.1	15.0	13.2
Percentage of persons 65 years and over	14.6	19.2	19.0	19.3	23.3
Percentage of single parent families	14.7	15.7	17.5	10.7	12.55
Percentage of total labour force unemployed	7.9	7.8	12.7	6.1	6.48
Percentage of occupied dwellings not owning a motor vehicle	10.9	12.6	16.9	10	14.8
Average number of motor vehicles ¹ owned per occupied dwelling	1.41	1.36	1.19	1.45	1.23
Percent driving to work of total employed persons (of persons travelling to work)	70.5 (85.3)	74.5 (88.2)	71.4 (83.9)	71.9 (86.7)	68.1 (81.8)
Percent taking public transport to work of total employed persons (of persons travelling to work)	7.4 (8.9)	6.2 (7.3)	7.8 (9.1)	7.3 (8.8)	8.2 (9.8)
Percent walk or bicycle to work of total employed persons (of persons travelling to work)	3.1 (3.8)	2.5 (3.0)	4.4 (5.2)	2.4 (2.9)	4.1 (4.9)

(Source: 2001 Census Basic Community Profiles and Snapshots State Suburbs. Retrieved on: 23rd August, 2004. Accessed from:

http://www.abs.gov.au/Ausstats/abs@census.nsf/Census_BCP_SS_ViewTemplate?ReadForm&CollapseView)

Table 3: Frequency distributions for demographic variables

Variable	Level	Frequency	Percentage of total respondents
Gender	Male	176	45.0
	Female	215	55.0
Household ownership	Own	282	72.1
	Rent	106	27.1
	Missing	3	0.8
Physical Limitation	Yes	56	14.3
	No	334	85.4
	Missing	1	0.3
Driver's licence	No licence	2	0.5
	Full licence	377	96.4
	Provisional	11	2.8
	Learner	1	0.3
Car driven recently	Yes	390	99.7
	No	1	0.3
Highest educational level	Pre-school	1	0.3
	Primary	30	7.7
	Secondary	144	36.8
	TAFE	82	21.0
	University	97	24.8
	Other	32	8.2
	Missing	5	1.3
Occupational status	Student full-time	8	2.0
	Student part-time	3	0.8
	Employed full-time	123	31.5
	Employed part-time	43	11.0
	Casually employed	32	8.2
	Not currently working for pay	6	1.5
	Full-time homemaker	25	6.4
	Regular volunteer worker	3	0.8
	Retired/pensioner	110	28.1
	Unemployed and actively seeking work	4	1.0
	Other	14	3.6
	Missing	1	0.3
	Invalid/Other	19	4.9

Table 4: Descriptive statistics for demographic variables

Variable	Mean (S.D.)	N
Age (years)	50.49 (18.23)	377
Lived in their area (years)	15.09 (15.76)	390
Household size	2.53 (1.30)	391
Number of workers	1.25 (1.61)	390
Number of licensed drivers	1.84 (1.02)	388
Number of vehicles	1.75 (0.91)	390
Number of bicycles	1.20 (1.46)	391

3.3 Currently active vs. currently inactive respondents

The primary aim of this study was to understand the perceived barriers to reducing car use. The most efficient way to do this is to investigate the factors differentiating individuals who are currently engaged in car use reduction, and those who are not. This was achieved in the present study via the inclusion of a specific statement (“*You have taken steps to reduce your car use*”) in section 2 of the questionnaire, in which respondents were required to give a verbal indication of their level of agreement with each statement.

A feature of the experimental design was that this pivotal statement was embedded among many other statements and related questions. The purpose of ‘hiding’ this pivotal statement among many other related statements and issues was to reduce demand characteristics (i.e., the possibility that respondents could guess the purpose of the study and provide socially desirable answers that they think the experimenters want) and to reduce experimenter bias (in this case, the possibility that the face-to-face interviewers could inadvertently bias the responses of participants with their attitudes, verbal intonations, or other non-verbal behaviours).

Respondents who either agreed or strongly agreed with the statement were deemed to be ‘Currently Active’ in reducing their car use, whereas respondents who either disagreed or strongly disagreed with the statement were deemed to be ‘Currently Inactive’ in reducing their car use. We then used this categorization of ‘Current Activity’ in discriminant analyses in an attempt to understand the factors influencing people’s travel decisions.

3.3.1 Discriminant analysis

Discriminant analysis is a multivariate technique that can identify the most important factors distinguishing people who are currently active in reducing their car use, and those who are not. This technique has been used successfully in previous studies of sustainable behaviour (e.g., McKenzie-Mohr et al., 1995). In discriminant analysis, structure coefficients represent the correlation between a predictor variable and the predicted group membership (Pedhazur, 1982).

The following results illustrate the most important travel issues which successfully distinguish between currently active vs. currently inactive respondents, ranked in decreasing order of importance (i.e., decreasing structure coefficients in the discriminant function). Generally, structure coefficients greater than .30 are considered meaningful; however, in Table 5 we have also reported the structure coefficients for issues which are close to the .30 cut-off in order to show which of the other less-important travel issues are the most important.

The test for equality of group centroids revealed that the selected variables successfully discriminated the centroids of respondents who were classified as ‘currently active’ and those classified as ‘not currently active’ (Wilks’s Lambda = .804, $\chi^2 = 66.07$, $p < .01$). This categorization of respondents accounted for 20% of the variance of the discriminant function (1 – Wilks’s Lambda). As can be seen in Table 5, ‘making small

changes to reducing car use' and 'convenience' appear to be by far the most important issues distinguishing currently active and currently inactive respondents.

The signs of the structure coefficients enable some interpretations of the results. It appears that 'making small changes to reducing car use' is a more important issue for currently active respondents (in accordance with the means described in Table 5), while 'convenience' is a more important issue for currently inactive respondents (again, in accordance with the means described in Table 5). Similar interpretation of the results reveals that, to a lesser degree, planning travel, commitment and traffic were more important issues for currently active respondents.

Table 5: Discriminant analysis comparing currently active and currently inactive respondents

Variables	Mean (SD)		Structure Coefficient
	Currently Active	Currently Inactive	
Making small changes to reducing car use	2.93 (1.06)	2.31 (1.10)	.57
Convenience	3.91 (.90)	4.26 (.74)	-.43
Planning travel	3.43 (1.00)	3.14 (1.12)	.29
Commitment	2.86 (1.04)	1.29 (8.50)	.28
Traffic	3.37 (1.25)	3.04 (1.26)	.27

3.3.2 Summary of results for currently active vs. currently inactive respondents

The results from the discriminant analysis revealed that by far the most important issues distinguishing currently active and currently inactive respondents (in terms of reducing car use) were 'making small changes to reducing car use' and 'convenience'. The first issue is important because it suggests that individuals who believe in the importance of making even small changes are very likely to be engaged in the behaviour of interest. In other words, individuals who are engaged in the behaviour of interest are likely to believe that working towards small goals was an important factor in changing their behaviour.

The emergence of convenience as the sole significantly discriminating barrier is also very important because it suggests that one way to market behaviour change tools is to appeal to an individual's expected level of convenience in their chosen travel mode. In other words, if confronted by an individual resistant to reducing car use, one might consider appealing foremost to whether any reduction in car use can overcome their concerns about loss of convenience. This in turn might explain why so many related issues often co-exist as barriers to reducing car use, for example saving time, comfort, flexibility, independence, connectivity (i.e., getting directly from A to B), waiting time, etc. These appear to be issues which arise from the need for convenience; in other words, the need to be able to access transport at a particular time and place (and possibly at a particular comfort level) that suits the individual.

A final point to note is that many of the issues which may have been expected (anecdotally) to differentiate between individuals who are engaged in sustainable travel behaviours and those who are not (such as saving time and comfort) were not found to be significantly discriminating variables in our discriminant analysis. A potential criticism is that this may be due to the failure of the discriminating statement ("You

have taken steps to reduce your car use") to adequately discriminate between those currently active and inactive in reducing their car use. Such a criticism, no matter how unwarranted, can only be overcome by conducting a similar study which selects the sample to be included in either group more appropriately. Despite this criticism, it appears that the issues found to be most important intuitively make sense. Additionally, it is likely that the lack of significance of certain issues in distinguishing between active and inactive respondents may be due to their lack of *relative* importance in defining travel concerns.

3.4 Open-ended questions

One of the primary reasons for including open-ended questions investigating perceived advantages, disadvantages, and barriers to reducing car use was to provide a comparison with the data obtained via statement agreement and importance methods (via Likert-type ratings scales). Responses to open-ended questions may reflect different cognitive processes from responses to rating scale-based questions, for example closed questions may limit the responses given by the participant, while open-ended questions may lead to biases relating to the expression of opinions in the presence of experimenters (Foddy, 1993, p. 127). Open-ended questions primarily require individuals to recall information from memory, as well as to formulate a response. Recall processes in particular are known to be vulnerable to biases, such as the accessibility bias, in which individuals are influenced in their decision-making by the accessibility of information (e.g., Jacoby, 1999).

Rating scale-based questions, on the other hand, require individuals primarily to assess their attitude to a particular piece of information (e.g., their level of agreement with a particular statement). The processes involved in ascribing a numerical or verbal value to this attitude are unclear, but undoubtedly involve either or both of two processes. One possibility is that the individual may assign a numerical rating of some sort to that attitude and then match their numerical rating to the appropriate verbal rating (e.g., 'Agree'). Another possibility is that the individual may simply assign a verbal rating to their attitude (e.g., 'I totally disagree') and match it with the appropriate verbal rating in the scale (e.g., 'I strongly disagree'). In any case, it is clear that open-ended questions rely on different cognitive processes from rating scale-based questions, and that an investigation of the perceived barriers of reducing car use elicited from open-ended questions is an essential component in identifying the most important barriers to an individual's decision to reduce their car use.

3.4.1 Advantages of reducing car use

Table 6 shows that by far the most prominent advantages for those currently active in reducing their car use, as well as those not currently active, are money savings and petrol savings. It is interesting to note that while 33% of those not currently active cited no perceived advantages of reducing their car use, a much lower percentage of currently active respondents (17%) cited no perceived advantage.

Table 6: Perceived advantages of reducing car use cited by currently active and currently inactive respondents

Currently Active			Currently Inactive		
Advantages	N	%	Advantages	N	%
Money savings	132	72.93%	Money savings	82	56.94%
Petrol savings	100	55.25%	Petrol savings	74	51.39%
Environmental benefits	56	30.94%	None	48	33.33%
Exercise	51	28.18%	Environmental benefits	23	15.97%
None	31	17.13%	Exercise	20	13.89%
			Reduced wear and tear	17	11.81%
Total	181		Total	144	

3.4.2 Disadvantages of reducing car use

Table 7 shows that while increased travel time is clearly the most prominent perceived disadvantage for currently active respondents, both increased travel time and inconvenience caused are the most commonly cited disadvantages of reducing car use for currently inactive respondents. It is interesting to note that 18% of currently active respondents cited no disadvantages to reducing car use.

3.4.3 Barriers to reducing car use

Table 8 shows that time, work-related issues, connectivity, and convenience are the most commonly cited barriers for both currently active and currently inactive respondents. Interestingly, 18% of currently active respondents cited no barriers to reducing their car use, suggesting a belief that they can reduce their car use further despite having already taken steps to do so.

Table 7: Perceived disadvantages of reducing car use cited by currently active and currently inactive respondents

Currently Active			Currently Inactive		
Disadvantages	N	%	Disadvantages	N	%
Time taken	61	33.70%	Time taken	41	28.47%
Inconvenience	36	19.89%	Inconvenience	38	26.39%
None	33	18.23%	Work	28	19.44%
Carrying loads	32	17.68%	Lack of connectivity	26	18.06%
Work	32	17.68%	Carrying loads	21	14.58%
Lack of connectivity	21	11.60%			
Total	181		Total	144	

Table 8: Perceived barriers to reducing car use cited by currently active and currently inactive respondents

Currently Active			Currently Inactive		
Barriers	N	%	Barriers	N	%
Time taken	45	24.86%	Time taken	39	27.08%
Work	42	23.20%	Work	30	20.83%
Lack of connectivity	37	20.44%	Inconvenience	28	19.44%
None	33	18.23%	Lack of connectivity	26	18.06%
Inconvenience	28	15.47%	Children	22	15.28%
Carrying loads	25	13.81%	Carrying loads	16	11.11%
Children	21	11.60%			
Total	181		Total	144	

3.5 Discriminant analyses for other specific behaviours

3.5.1 Car-pooling

The specific behaviour related to car-pooling was measured by respondents' level of agreement with the statement "You would not consider car-pooling". One hundred and sixty nine respondents were classified as 'not against car-pooling', while 108 respondents were classified as 'against car-pooling'.

The test for equality of group centroids revealed that the selected variables marginally discriminated the centroids of respondents who were classified as 'against car-pooling' and those classified as 'not against car-pooling' (Wilks's Lambda = .812, $\chi^2 = 52.82$, $p < .06$). This categorization of respondents accounted for 19% of the variance of the discriminant function.

Table 9 shows that the key issues separating those who can be considered to be against car-pooling and those who are not against car-pooling are (in order) comfort, enjoyment of driving, and reliance on car. All of these variables are more important for those against car-pooling.

Table 9: Issues distinguishing those against and those not against car-pooling

Variable	Structure Coefficient
Comfort	-.42
Enjoyment of driving	-.42
Reliance on car	-.37

3.5.2 Trip-chaining

The specific behaviour related to trip-chaining was measured by respondents' level of agreement with the statement "You cannot see the benefits of using your car to do several things before returning home". Three hundred and thirty six respondents were classified as 'not against trip-chaining' while 34 respondents were classified as 'against trip-chaining'.

The test for equality of group centroids revealed that the selected variables successfully discriminated the centroids of respondents who were classified as 'against trip-chaining' and those classified as 'not against trip-chaining' (Wilks's Lambda = .844, $\chi^2 = 59.19$, $p < .05$). This categorization of respondents accounted for 16% of the variance of the discriminant function.

Table 10 shows that the key issues separating those who can see the benefits of trip chaining and those who do not are (in order) planning days, safety, independence, habitual driving, stress while driving, social interaction, and saving time. All of these variables were more important for those not against trip-chaining.

Table 10: Issues distinguishing those against and those not against trip-chaining

Variable	Structure Coefficient
Planning days	.42
Safety	.39
Independence	.39
Using car without thinking (habit)	.36
Stress while driving	.35
Social Interaction	.33
Saving time	.32

3.6 Discriminant analyses for selected psychological predictors

An important feature of the current study was the inclusion of statements representing issues identified in the psychology literature as being potentially important factors distinguishing the mindset of those who are likely to enact travel behaviour change and those who are not. A number of statements were considered to be indicative of potential psychological predictors. Respondents' level of agreement on these statements was assumed to be a crude surrogate for their position along the corresponding psychological dimension.

Each respondents' level of agreement with each representative statement was used to assign respondents as either exhibiting that trait (if 'Agree' or 'Strongly Agree', for positively-framed statements), or not exhibiting that trait (if 'Disagree' or 'Strongly Disagree', for positively-framed statements).

A series of discriminant analyses were performed for each psychological and social predictor expected to be important in distinguishing those individuals who are more likely to enact car reduction behaviours in future. The most important travel issues for each categorization by psychological variable are illustrated, ranked in decreasing order of importance (i.e., decreasing structure coefficients in the discriminant function). Only those issues with structure coefficients exceeding .30 are reported.

3.6.1 Futility/pessimism

The psychological dimension referred to in previous studies as futility (e.g., Walton, Thomas & Dravitzki, 2004) was measured by respondents' level of agreement with the statement '*It is useless for you to reduce your car use if other people don't do the same*'. One hundred and nine respondents were classified as 'pessimists' while 225

respondents were classified as 'non-pessimists' (importantly, it is inappropriate to classify this group as 'optimists' because not being a pessimist does not psychologically equate to being an optimist). The test for equality of group centroids revealed that the selected variables successfully discriminated the centroids of respondents who were classified as 'pessimists' and those classified as 'non-pessimists' (Wilks's Lambda = .832, $\chi^2 = 57.55$, $p < .05$). This categorization of respondents accounted for 17% of the variance of the discriminant function.

Table 11 shows that pessimists value their enjoyment of driving and reliance on their car as more important travel issues than non-pessimists. This finding intuitively makes sense, but is also particularly interesting, given that enjoyment of driving may be viewed as a socially undesirable response, suggesting that perhaps the statement may be representing another psychological dimension, *futility* (i.e., the belief that one may as well enjoy driving, since it is useless to attempt to engage in pro-environmental behaviours). Additionally, Table 11 shows that driving time and the availability and existence of local shops and services were more valued by non-pessimists than pessimists.

Table 11: Issues distinguishing pessimists and non-pessimists

Variable	Structure Coefficient
Enjoyment of driving	.40
Car reliance	.39
Driving time	-.32
Local shops and services	-.31

3.6.2 Habitual driving

The psychological dimension relating to habitual driving, or individuals automatically choosing the car as the most appropriate transport mode, was represented by the statement '*You just automatically use your car without thinking*'. One hundred and fifty three respondents were classified as 'habitual drivers' while 199 respondents were classified as 'non-habitual drivers'. The test for equality of group centroids revealed that the selected variables successfully discriminated the centroids of respondents who were classified as 'habitual drivers' and those classified as 'non-habitual drivers' (Wilks's Lambda = .781, $\chi^2 = 81.50$, $p < .001$). This categorization of respondents accounted for 22% of the variance of the discriminant function.

Table 12 shows that respondents classified as 'habitual drivers' (those who use their car without thinking) rated reliance on their car, comfort, convenience, and independence as significantly more important travel issues relative to 'non-habitual drivers'. These results make intuitive sense, and demonstrate the success of the technique of using attitudinal statements to categorize groups of individuals for discriminant analysis.

Table 12: Issues distinguishing habitual drivers from non-habitual drivers

Variable	Structure Coefficient
Car reliance	.39
Comfort	.31
Convenience	.31
Independence	.30

3.6.3 Commitment

The psychological dimension relating to an individual's level of commitment to reducing car use was represented by the statement '*You are not willing to make a commitment to reduce your car use*'. Two hundred and six respondents were classified as 'committed' while 98 respondents were classified as 'non-committed'. The test for equality of group centroids revealed that the selected variables successfully discriminated the centroids of respondents who were classified as 'committed' and those classified as 'not committed' (Wilks's Lambda = .715, $\chi^2 = 94.01$, $p < .001$). This categorization of respondents accounted for 28% of the variance of the discriminant function.

The most significant factor distinguishing between those who are *likely to be committed* to reducing their car use and those who are not likely to be committed is the issue of making small changes in reducing their car use (structure coefficient = 0.41). This confirms a number of findings in the psychological literature suggesting that if one is able to obtain a commitment from an individual for even a small change in their behaviour, one is likely to be successful in encouraging engagement in more complex behaviours. This finding, in other words, suggests that commitment techniques used to encourage even minor behavioural changes may prove to be successful.

3.7 Discriminant analyses for selected demographic variables

Given the success of the discriminant analyses in identifying the most important factors in people's travel decisions, it was decided to conduct similar analyses on selected demographic variables.

3.7.1 Gender

This study comprised 176 male respondents and 215 female respondents. The test for equality of group centroids revealed that the selected variables did not successfully discriminate the centroids of male and female respondents (Wilks's Lambda = .869, $\chi^2 = 49.99$, $p < .1$). This categorization of respondents accounted for 13% of the variance of the discriminant function. Since the test for equality of group centroids did not reach significance at the $p = .05$ level when all issues were included in the discriminant function, it would be inappropriate to explore the specific issues distinguishing males and females.

3.7.2 Physical limitation

Fifty six respondents had a physical limitation while 334 respondents did not. The test for equality of group centroids revealed that the selected variables successfully discriminated the centroids of respondents with and without physical disabilities (Wilks's Lambda = .859, $\chi^2 = 55.86$, $p < .05$). This categorization of respondents accounted for 14% of the variance of the discriminant function. Those with a physical limitation rate local community benefits (structure coefficient = 0.35) and time savings (structure coefficient = 0.34) as significantly more important factors than those without a physical limitation. Again, these results make sense intuitively, and suggest that those

who are restricted in their mobility particularly value the time they can save while travelling as well as the proximity of local shops and services to meet their needs.

4. Conclusion

The primary aim of the current study was to contribute to travel behaviour change research by advancing our understanding of the most important issues and reasons people offer for engaging or not engaging in sustainable travel behaviours relating to a reduction in car use. The identification of perceptions of 'convenience' and the 'importance of making small changes' as the dominant factors distinguishing those who identify themselves as actively trying to reduce their car use from those who are not currently active in this behaviour, suggests that these are potentially important factors to be addressed when developing strategies for changing travel behaviour.

To understand more accurately the factors differentiating those currently engaged and not engaged in specific car-use reduction behaviours such as car-pooling and trip-chaining, future research could ask individuals who are currently engaged (or not engaged) in a particular behaviour (e.g., car-pooling) to identify the perceived benefits and barriers for that specific behaviour. The data from the current study do not provide this level of detail and specificity, because respondents were asked to rate the importance of issues in relation to their '*travel decisions*'. Thus, future studies may shed further light on the factors differentiating groups of individuals who are engaged or not engaged in responsible environmental behaviours by tailoring the surveys and questions to the specific behaviour of interest. In any case, the information obtained from this study may be able to suggest key differences in the *priorities* of people who are or are not engaged in certain behaviours.

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References

Boyce, T E and Geller, E S (2000) A community-wide intervention to improve pedestrian safety: Guidelines for institutionalizing large-scale behavior change *Environment & Behavior* 32(4), 502-520

- Cox, B S, Cox, A B and Cox, D J (2000) Motivating signage prompts safety belt use among drivers exiting senior communities *Journal of Applied Behavior Analysis* 33 (4), 635-638
- Farley, C, Otis, J and Benoit, M (1997) Evaluation of a four-year bicycle helmet promotion campaign in Quebec aimed at children ages 8 to 12: impact on attitudes, norms and behaviours *Canadian Journal of Public Health* 88 (1), 62-66
- Foddy, W (1993) *Constructing Questions for Interviews and Questionnaires: Theory and Practice in Social Research* Cambridge: Cambridge University Press
- Garvill, J (1999) Choice of transportation mode: factors influencing drivers' willingness to reduce personal car use and support car regulations In: Foddy, M, Smithson, M, Schneider, S, Hogg, M (eds) *Resolving Social Dilemmas: Dynamic, Structural, and Intergroup Aspects* Taylor & Francis, Philadelphia
- Hines, J M, Hungerford, H R and Tomera, A N (1987) Analysis and synthesis of research on responsible environmental behavior: A meta-analysis *Journal of Environmental Education* 18, 1-8
- Jacoby, L L (1999) Deceiving the elderly: Effects of accessibility bias in cued-recall performance *Cognitive Neuropsychology* 16 (3-5), 417-436
- Katzev R and Wang, T (1994) Can commitment change behavior? A case study of environmental actions *Journal of Social Behavior and Personality* 9, 13-26
- McKenzie-Mohr, D (2000) Fostering sustainable behavior through community-based social marketing *American Psychologist* 55 (5), 531-537
- McKenzie-Mohr, D, Nemiroff, L S, Beers, L and Desmarais, S (1995) Determinants of responsible environmental behavior *Journal of Social Issues* 51 (4), 139-156
- McKenzie-Mohr, D and Smith, W (1999) *Fostering sustainable behavior: An introduction to community-based social marketing* (2nd ed) Gabriola Island, British Columbia, Canada: New Society
- Pedhazur, E J (1982) *Multiple regression in behavioural research: Explanation and prediction* New York: Holt, Rinehart and Winston
- Tracy, A P and Oskamp, S (1984) Relationships among ecologically responsible behaviors, *Journal of Environmental Systems* 13, 115-126
- Walton, D, Thomas, J A and Dravitzki, V (2004) Commuters' concern for the environment and knowledge of the effects of vehicle emissions *Transportation Research Part D* 9, 335-340