The Role of Norms in Mode Choice

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Abstract
The research reported here considers the role of attitudes, norms and control in transport mode choice, specifically attempts to reduce car use through individualised marketing campaigns. Much work to reduce car use focuses on the provision of information. Often, this information is concerned with persuading people of the need to reduce car use, and increasing their awareness of the alternatives available. It is hoped that the information provided will change individuals' attitudes towards car use and the use of alternatives, and thus cause them to reduce their car use (i.e., change their behaviour). The most sophisticated projects will tailor information so that it is personally relevant to individuals and specific journeys for which it is feasible to use an alternative to the car. Few projects are explicitly structured around a theory of behaviour or how to change behaviour, although the idea that attitudes are fundamental is often implicit. That is to say, the idea that to change behaviour, you need to change attitudes is central. However, theories of behaviour, e.g. Ajzen's Theory of Planned Behaviour (TPB), indicate that other factors in addition to attitudes inform behaviour. The TPB suggests that behaviour is in fact the result of relevant intentions, and is not directly influenced by attitudes. The TPB suggests that these intentions are formed from a combination of attitudes, subjective norms and perceived behavioural control (PBC). Research that specifically tested the TPB in relation to reducing car use, supports the idea that PBC and norms can be significant in relation to reducing car use. Additionally, the research suggested that attitudes were not always significant to actual change when the fact that car use has negative impacts is already accepted. The results of the research are presented and the consequences for TPB operationalisation in the context of reducing car use are discussed. The potential role of personal norms is also considered.

Keywords: Theory of Planned Behaviour, Norms, Reducing car use.

1 Introduction
This paper reports on research to investigate and understand responses to individualised marketing campaigns (IMCs) to reduce car use. IMCs work with individuals to help them reduce their car use by providing information that is relevant to the person and the journeys they make.

IMCs have been introduced in Europe, Australia and America to varying degrees of success. Two leading IMC projects have been developed – Indimark®/Travel Smart® developed by SocialData, and Travel Blending®/Living Neighbourhoods® developed by Steer Davies Gleave. Both projects have been implemented internationally. Success rates vary considerably, with reductions in car use ranging from of 1% to 20% plus. In the UK reductions range from approximately 3% to nearly 7%. Direct comparisons between projects is difficult as sampling and monitoring methods vary. However, cost-benefit analysis of the Travel Smart® project in Perth, Western Australia has demonstrated that the project represents value for money. Nevertheless, there is concern amongst UK local authorities who are increasingly required to implement travel awareness schemes, that individualised marketing looks promising, but does not deliver in terms of reducing the number of cars on the road (the visible change that the authorities would like to see), and is consequently too expensive for the results obtained. At the end of 2002 the UK Government announced nearly £300,000 worth of funding for IMC demonstration projects to improve understanding of effectiveness and identify best practice. This will make a positive contribution to the rather small body of evidence relating to IMCs, particularly in the UK where there were only two projects (that the author is aware of) prior to 2001. The completion of this project is therefore particularly timely in that it will contribute knowledge that identifies how reductions in car use through IMCs are achieved in theoretical terms. This theory can then be used to improve the design and implementation of future projects.

In the research reported here, the Theory of Planned Behaviour (TPB) was used to analyse individuals' responses to experimental IMCs, and thus consider the role of attitudes, subjective norms and perceived behavioural control (PBC) in the process of car use reduction. There is a long history of research associating attitudes with behaviour within social psychology dating back to Allport (1935), and this is reflected in much of the work relating to reducing car use (Ampt and Rose, 2001; INPHORRM, 2004; TAPESTRY, 2004). However, there is also a considerable body of evidence stating that behaviour is the result of more than just attitudes (Fishbein, 1967; Wicker,

1969; Ampt and Taylor, 2003). In particular, norms and PBC have been shown to be significant (Fishbein and Ajzen, 1975; Ajzen and Madden, 1986; Ajzen, 1991). Whilst many IMCs have been implemented without a theoretical basis, it is likely that IMCs influence an individuals' PBC through the specific information about alternatives to the car for particular journeys that is provided, whilst attitudes may be influenced through more general information regarding the need to reduce car use. Where an IMC is implemented with a defined group of people who are made aware of their own progress and that of others in the group, subjective norms regarding that particular set of referents may also be influenced. However, many studies utilising the TPB in transport studies with a focus on mode choice find that attitudes and PBC are significant, whilst subjective norms are either not significant, or make minimal contribution to explanation (Forward, 1998; Staats and Harland, 1995). This research hypothesised that it is not attitudes that need to be changed to reduce car use, but subjective norms and perceived behavioural control. This hypothesis was based on evidence that the general public already accept that car use has negative impacts that need to be reduced through less car use, but do not actually reduce their car use (Jopson, 2003). The work reported here concurs with others (Forward, 1998; Staats and Harland, 1995) in that PBC is significant to reducing car use, but also suggests that the role of subjective norms may be greater than previously thought. The potential role of norms in reducing car use is thus discussed in greater detail.

The research reported here also extends the use of the TPB in transport studies, by adding to the relatively small body of evidence, and by seeking to explain behaviour as well as intentions. Interest in the TPB is growing in the transport field and it is being or has been used to examine a range of behaviours, including mode choice (Ahern and O'Mahony, 2003; Anable, 2002; Bamberg and Schmitt, 1999; Forward, 1998) and driving violations (Parker et al, 1992a and 1992b; Stradling 1997). However, the majority of studies are outside the transport context and many of the behaviours investigated have more direct physiological impacts, e.g., dieting. Typically, the TPB is able to explain approximately 50% of intention and 25% of actual behaviour. Discussion of whether this is an acceptable and useful level of performance is limited. However, there appears to be consensus that whilst performance could be improved, the TPB is useful in that it identifies salient predictors of behaviour. Additionally, much previous work, especially in transport studies, only considers explanation of intentions, much less goes on to explain behaviour as well (Jopson, 2003). In extending the use of the TPB in transport studies, the results challenge the efficacy of the basic operationalisation of the theory when used to consider reductions in car use. This is discussed in greater detail later in the paper.

The remainder of this paper goes on to outline the TPB (Section 2), and set out the methodology used in this research (Section 3), before presenting the results (Section 4). Section 5 then goes on to discuss the implications of the results, whilst Section 6 draws conclusions from the research.

2 The Theory of Planned Behaviour

The TPB – see Figure 1 - is an extension of the Theory of Reasoned Action (TRA; Ajzen and Fishbien, 1977). The TRA is concerned purely with decisions that are within an individual's volitional (conscious) control. According to the TRA, the proximal determinant of a behaviour is our intention to engage in that behaviour. Intention, according to the TRA, is determined by an individual's attitudes and subjective norms. The TPB adds perceived behavioural control (PBC) as a determinant of both intentions and behaviour to extend the coverage of the model to incorporate behaviours outside an individual's volitional control. PBC comprises internal control factors incorporate self-efficacy, and external factors incorporate influences beyond the individual's control. These include dependence on others and chance. PBC is "assumed to reflect past experience as well as anticipated impediments and obstacles" (Ajzen, 1988).

Each of the determinants of intentions (attitudes, subjective norms and PBC) are themselves determined by a set of antecedent beliefs – see Figure 1. "Attitudes are a function of beliefs about the perceived consequences of the behaviour [under consideration] based upon two perceptions: the likelihood of that outcome occurring as a result of performing the behaviour and the evaluation of that outcome" (Conner and Norman, 2001). This is expressed by an expectancy-value equation; equation A

$$A_B \propto \sum_n b_i e_i \qquad \text{Equation A}$$

where A_B is the attitude towards behaviour B, b_i is the belief (subjective probability) that performing behaviour B will lead to outcome i, e_i is the evaluation of outcome i, and the sum is over the n salient behavioural beliefs (Ajzen, 1988).

Subjective norms are "a function of normative beliefs, which represent perceptions of specific significant others' preferences about whether one should or should not engage in a behaviour" (Conner and Norman, 2001). The model quantifies this as "the subjective likelihood that specific salient groups or individuals (referents) think that person should perform the behaviour [in question], multiplied by the person's motivation to comply with the referent's expectation" (Conner and Norman, 2001). This is expressed by equation B.

$$SN_B \propto \sum_n b_j m_j \qquad \text{Equation B}$$

where *SN* is the subjective norm relating to behaviour *B,* b_j is the normative belief concerning referent *j,* m_j is the person's motivation to comply with referent *j* and the sum is over the *n* salient normative beliefs (Ajzen, 1988).

Perceived behavioural control is influenced by "beliefs concerning whether one has access to the necessary resources and opportunities to perform the behaviour successfully, weighted by the perceived power of each factor to facilitate or inhibit the execution of the behaviour" (Conner and Norman, 2001). This is expressed by equation C.

$$PBC_B \propto \sum_n b_k d_k \qquad \text{Equation C}$$

where *PBC* is the PBC relating to behaviour *B,* b_k is the belief that behaviour *B* can be carried out over time period *k,* d_k is how difficult carrying out behaviour *B* in time period *k* will be, and the sum is over the *n* salient control beliefs (Forward, 1998).

The influence of these antecedent beliefs on attitudes, subjective norms and PBC, and their influence on intentions and behaviour demonstrate a clear causal chain.

When operationalising the TPB, some researchers have included additional independent variables (e.g., habit). It can be argued that such additional variables are already incorporated into the original formulation of the model. This research has concentrated on the original formulation of the TPB to establish whether this works with regard to reducing car use. Without knowing how the theory performs in its basic operationalisation, it would be impossible to establish what, if anything, is gained when constructs such as habit are considered as distinct inputs to the model. Whilst questions relating to additional constructs could be asked and data analysed selectively to permit analysis of the original model, inclusion of the additional questions in a TPB questionnaire would influence peoples' responses to questions relating to the core concepts.

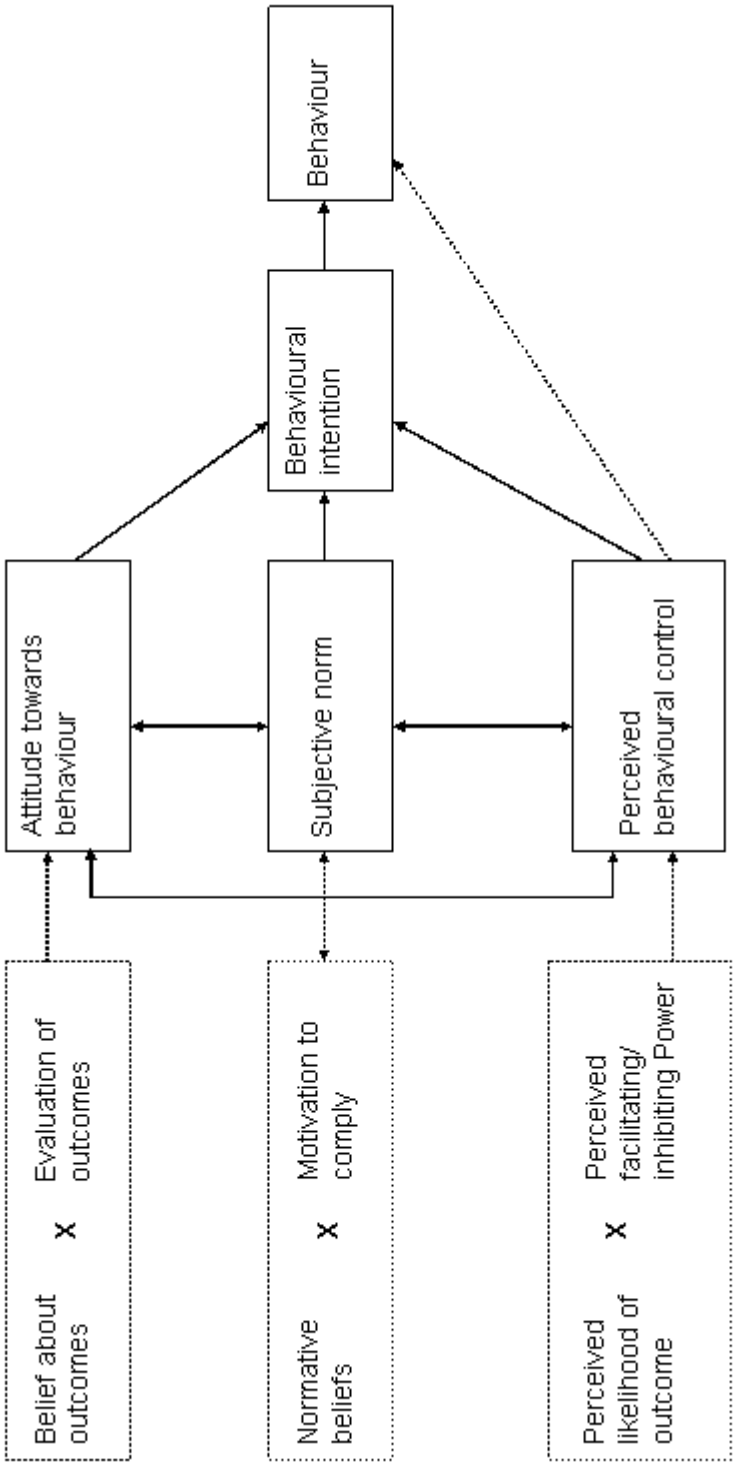
3 Methodology

3.1 The Experimental IMCs and Control Groups

An experimental IMC was implemented in conjunction with TPB analysis. The experimental IMC was modelled on Travel Blending® as it was implemented in Leeds (Steer Davies Gleave, 1998) with the kind permission of Steer Davies Gleave who gave consent for a small scale replication of Travel Blending® to be implemented in Leeds and Greater Manchester for the purposes of this research. However, the experimental IMC was not known as or associated with Travel Blending® to avoid any potential bias. The experimental work altered some aspects of the Travel Blending® procedure in light of the comments from Leeds Travel Blenders. Most notably, the length of the travel diaries used to obtain individuals' travel data was reduced from a week to three days. Two cities were used to enable comparison that would reveal the existence of city effects.

Participants were recruited through their workplaces in Leeds and Manchester using e-mail, posters and leaflets explaining what the IMC was. Those who volunteered to take part were sent a three day travel diary and TPB questionnaire to complete. The questionnaire also checked for any mobility problems, and other practical barriers to reducing car use. The diaries were then analysed to identify the journeys that people made and journeys that could be undertaken using public transport, by bicycle or on foot. Feedback was sent to participants giving details of the alternatives available for the journeys they made. Trip chaining was also suggested where appropriate, as were alternatives such as teleshopping and undertaking multiple activities in one place, or use of local amenities. An information leaflet explaining the need to reduce car use and the benefits of using alternatives was also included, as were a second travel diary and TPB questionnaire to collect monitoring data. Participants were asked to complete the second diary and questionnaire four weeks after receiving their feedback pack to give them an opportunity to change their travel

The Theory of Planned Behaviour
Figure 1



Adapted from Ajzen (1988) and Conner and Sparks (2001)

patterns, but not so long that they would forget. This after data identified behaviour change in terms of whether or not the number of car driver journeys an individual made had been reduced, as well as any changes in beliefs. It also allowed differences between those who did and did not reduce their car use in terms of beliefs and socio-demographic characteristics to be identified.

It is worth noting here that the recruitment method used, means that the sample was self-selecting. However, this is not considered a problem, since the methodology used here reflects that used in real life IMCs; thus the self-selecting sample here is thought likely to mirror those who volunteer to take part in IMCs implemented by local authorities.

A control survey was used to obtain a dataset from people who had not received any intervention against which the experimental results could be compared. The desire was to establish whether behaviour change achieved was the result of the intervention or some other factor. Thus, the same number of respondents was sought for a control survey in both Leeds and Manchester as were sought for the main experimental IMC. The control cohorts were sought from companies similar to those involved with the experimental project to allow a comparable sample to be obtained. The control cohorts were asked to complete a questionnaire at more or less the same time as the experimental after questionnaire to allow comparability. The questionnaire asked the same TPB and personal questions, with an additional question to ascertain whether respondents had changed their travel behaviour in the past three months (i.e., the period over which the experimental project was running), and if so, how and why. The control respondents were not asked to complete a travel diary, as, after discussion with employers, this was felt to be a particularly onerous task, if neither the company, nor the respondents were to receive any intervention with the potential for beneficial behaviour change.

3.2 Operationalisation of the Theory of Planned Behaviour

To identify the issues that should be included in the TPB questionnaire, in-depth interviews were undertaken with the Leeds Travel Blending® participants. These discussed the attitudes, subjective norms and control factors participants associated with car use and the decision to drive or not. Other attributes that the researcher considered important based on previous work were also included. Attitude questions included the following topics; atmospheric pollution, protection from the weather, reliability, exercise, comfort, congestion, privacy, safety, convenience, expense and accessibility. Subjective norm questions include partner, boss, parents, friends, colleagues and children as significant others. PBC questions covered bus and train use, cycling and walking. All questions were asked about in relation to the target behaviour, i.e., car use.

Operationalisation of the TPB followed the standard format, and used a number of paired bipolar semantic differential questions to measure the attitudes, subjective norms and PBC antecedent beliefs. Intentions are also measured with bipolar semantic differential questions, but they need not be paired. Figure 2 illustrates the format of TPB questions using examples from the experimental questionnaire. The first question in a pair measures the belief in relation to the individual and the action under consideration, i.e., the item beliefs. The second part measures the outcome evaluation of the action, i.e., the evaluation item. For attitudes, the first question measures the attitude belief in relation to the individual and the second evaluates the outcome. For subjective norms the belief item is concerned with normative beliefs and the evaluative measure is motivation to comply. For PBC the belief item is perceived likelihood of occurrence and the evaluative measure is perceived facilitating/inhibiting power. A plus three, minus three semantic differential scale was used as this was considered most appropriate for use with bipolar descriptors. However, the responses were converted to a one to seven scale for analysis.

3.3 Analysis Procedures

This section briefly outlines the statistical procedures used in the TPB analysis for this research, including procedures to check the reliability and validity of the data.

Attitudes, subjective norms and PBC data were regressed – using multiple regression - onto intention to establish whether the antecedent beliefs considered explain intentions. Intentions were then considered an independent variable and regressed onto behaviour with PBC, which can have a direct effect on behaviour (see Figure 1)[1]. Multiple regression is the standard approach to analysis of TPB data, and should be used in the first instance, unless there is a sound statistical

[1] It should be noted that if intentions are not explained in the first instance, one would not expect them to explain behaviour.

Theory of Planned Behaviour Questions
Figure 2

Attitudes ([1]Belief about outcomes, [2]Evaluation of outcomes)

[1]Using a car pollutes the atmosphere

Likely	3	2	1	0	-1	-2	-3	Unlikely

[2]Polluting the atmosphere is

Good	3	2	1	0	-1	-2	-3	Bad

Subjective Norms ([1]Normative beliefs, [2]Motivation to comply)

[1]My partner thinks I

Should	3	2	1	0	-1	-2	-3	Should not

Use a car less over the next month

[2]With regard to your using a car, how much do you want to do what your partner thinks you should do

Very much	3	2	1	0	-1	-2	-3	Not at all

Perceived Behavioural Control ([1]Perceieved likelihood of occurrence, [2]Perceived facilitating/inhibiting power)

[1]I could catch a bus instead of using a car for some journeys over the next month

Agree	3	2	1	0	-1	-2	-3	Disagree

[2]For me to catch a bus for some journeys over the next month is

Easy	3	2	1	0	-1	-2	-3	Difficult

Intentions

I intend to use a car less over the next month

Do	3	2	1	0	-1	-2	-3	Do not

How likely is it that you will use a car less over the next month

Likely	3	2	1	0	-1	-2	-3	Unlikely

argument for pursuing an alternative approach[2]. One such argument might be when data does not meet the requirements of parametric analysis a priori. On other occasions, the data may not fit the multiple regression model well. In this case, the data did meet the requirements of parametric tests, and it did fit a multiple regression model, thus it was not necessary to pursue alternative analysis procedures. The attitude, subjective norm and PBC data was processed using equations A, B and C above to provide the independent variable data. Data from the two intention questions was summed.

Prior to regression, the attitude, subjective norm and PBC data was also checked for internal reliability using Cronbach's alpha. Internal reliability confirms that the questions asked all measured what they set out to measure. Each independent variable in the TPB is measured using multiple items (pairs of questions), all relating to car use. Taking the attitudes variable as an example, it is necessary to confirm that all the items (individual questions) are indeed measuring attitudes with regard to car use, not some other attitudes. High internal consistency (indicated by high correlations between item scores) indicates that all the items are measuring the same variable (i.e., attitudes towards car use), whereas low consistency indicates that the items are measuring multiple variables.

The Cronbach's alpha test splits the data in half in every way possible, and compares the resulting halves for consistency. Cronbach's alpha values can range between 0 and 1. High values are considered to be around 0.75 to 1, although Aron and Aron (1998) note that values of less than 0.6 can be acceptable. Whilst Aron and Aron (1998) suggest that values below 0.6 can be acceptable, it is felt that more robust analysis will be achieved with higher values (around 0.75) of Cronbach's alpha. Where acceptable alpha values are not obtained in the first instance, it is possible to increase the reliability of a test through item analysis (Coolican, 1999). It is possible to calculate a Cronbach's alpha value for each individual item and then deduce what the overall score would be if individual items were removed. Items that correlate least with other items can then be removed and the variable set re-tested in a process of elimination until an acceptable Cronbach's alpha is achieved.

A criticism of this process is that high reliability may be achieved at the cost of a reduction in validity if too many items are removed. Coolican (1999) cites the example of intelligence tests,

[2] MANOVA is also recommended by some researchers, but this does not provide control over the way in which data is entered into the regression modal that is generated (in SPSS at least), and provides less detailed information. Additionally, MANOVA should not tell a significantly different story to multiple regression. When used with the data collected through this research, this proved to be true, MANOVA did not produce different results.

"which, though quite reliable, measure only a narrow range of intellectual ability, missing out, for instance, the whole range of creative thought which the public language definition would include." To establish whether high reliability has been gained at the cost of excessive loss of validity, validity can be examined using factor analysis to analyse construct validity. Factor analysis extracts components that correlate highly with particular items, on the basis that the components account for much of the variance in the dataset (although the extracted factors themselves are orthogonal). If, when all items are subject to factor analysis, the resulting factors contain the items that remain after the Cronbach's alpha retest process, then the combination derived through Cronbach's alpha is valid. In this case it was necessary to subject the attitude data to factor analysis. Exploratory factor analysis was used, since this is most appropriate in the development of theory.

The next section will now go on to present the results of the experimental IMCs as well as the TPB analysis.

4 Results

Section 4 describes the sample obtained through the experimental IMCs and control surveys, before going on to report the beliefs of the IMC respondents, the internal reliability of the data and reduction in car use achieved. Section 4 concludes by reporting the TPB analysis.

4.1 Sample composition

A number of non-drivers responded to the surveys despite requests for drivers only. These respondents have been removed from the data set used for analysis. Further to this, a small number of drivers who made an extremely high or low number of car journeys - usually due to atypical events - which appeared as outliers, were also removed to avoid biasing the analysis. Outliers were defined as cases with a total number of car journeys exceeding one standard deviation from the mean. One standard deviation was chosen, as more than one removed so few cases, it made no difference, whilst less removed data not obviously different to that retained. Consequently it should be borne in mind that the results apply to car drivers making an average number of journeys. The fact that meaningful analysis has only been possible with the portion of the sample that can be described as average is not surprising as one would not expect those driving above or below average mileage to have the same reasoning as the average driver. The final sample sizes are presented in Table 1.

Table 1
Respondents returning a travel diary and questionnaire before and after intervention

	Total travel diary and questionnaire	Non-drivers removed	Respondents removed due to outlying travel data	Usable data
Leeds experimental cohort	19	3	2	14
Leeds control* cohort	29	3	n/a	27
Manchester experimental cohort	20	2	1	17
Manchester control* cohort	40	3	n/a	38
TOTAL experimental	-	-	-	**31**
TOTAL	-	-	-	**94**

* questionnaire only.

These final sample sizes are considerably less than initially sought. More people returned the before surveys than the after surveys, but the response rate per cohort was still less than was hoped for at the outset. Given that 120 volunteers were sought for the experimental cohorts on the basis of response to a real life IMC (Travel Blending® in Leeds), which experienced a drop out rate of approximately 47%, it is not clear why so few people responded. However, there are a number of possible reasons. Travel Blending® in Leeds was implemented at the City Council Highways, Planning and Development offices, West Yorkshire Passenger Transport Authority and Executive offices, Steer Davies Gleave's Leeds office and the Boys Grammar School (Steer Davies Gleave, 1998). Consequently, many of those taking part may have had work related motivations for taking part and not dropping out. A further reason may have been dislike of the survey materials (both the questionnaire and travel diary) and survey fatigue. The questionnaire may have appeared repetitive, although this issue was tackled in a covering letter explaining that the questionnaire was based on a scientific model and therefore appeared as it did for a reason. An incentive – a £50

prize draw - was offered. With hindsight this may have encouraged people with no real motivation to change their travel behaviour to volunteer, and therefore resulted in a high drop out rate.

As the separate experimental cohorts in Table 1 were too small to be analysed with multiple regression, t tests were run to establish the degree of difference between the cohorts, with a view to merging the groups to create a bigger pool of data for analysis with multiple regression. t Tests were run to test for difference between the Leeds and Manchester experimental respondents on the basis of residential location (in or outside the city), age, gender, occupation, qualifications, number of children in household, car ownership, number of car trips reported and total number of journeys reported. The t statistics suggested that there was little significant difference at the 0.01 and 0.05 levels. Where there was difference, examination of the raw data indicated that the differences would not invalidate a merged data set. Thus the two groups were combined for the purposes of analysis, to give an experimental n of 31. As an n of 31 is still rather small, further t tests were undertaken to establish whether there was any difference between the experimental and control groups, again with a view to combining the two groups for the purposes of analysis. Again there were no differences that gave cause for concern. Thus the experimental and control groups in both Leeds and Manchester have been combined. This gives an n of 94. However, this can only be used for analysing intentions, since no behavioural data is available for the control groups. For this reason analysis of behaviour is limited to an n of 31.

It is worth acknowledging here that the small sample size means results are only relevant to the small sector of the population represented by those who took part in this research. However, the small response here reflects that lack of interest in car use reduction programmes in the UK and given the observations regarding the self-selecting nature of the sample above, is not considered overly problematic, so long as the reader remembers that the results here are only indicative of what may be true for a narrow section of the whole population.

4.2 Socio-demographics

In socio-demographic terms, those who completed the before surveys tended to live outside of the city (beyond the outer ring road), be men aged between 26 and 55, work in office based occupations (especially administration) and hold A' levels or equivalent qualifications. Unsurprisingly, the usual mode of transport is the car as driver. It is not clear why most initial respondents live outside the city, since one might expect those within the city where there is denser provision of alternatives to respond more readily. However, it could be that the radial, corridor based public transport networks in Leeds and Manchester, mean that those living outside of the city have more scope to reduce their car use by using these public transport corridors than those living inside the city needing to make cross-city journeys. Amongst those who went on to return the after survey and complete the IMC process, the t tests did not identify notable significant differences between Leeds and Manchester, suggesting that results will be transferable to similar populations elsewhere. Amongst those who did reduce their car use, more were women and over all there was a higher level of educational attainment.

4.3 Beliefs in Relation to Car Use

Segmentation by attitudes, subjective norms and PBC is also possible. With regard to attitudes, it is apparent that within the group who returned the before surveys and reduced their car use that there are people who are less concerned about protection from the weather and privacy than one might assume. Additionally, beliefs that car use is safe and reliable are held less strongly than is often assumed.

In terms of subjective norms, there was a lot of ambivalence with regard to motivation to comply with the wishes of significant others, but a view that others did not want the respondent to reduce their car use. However, these norms were significant in regression analysis as discussed below, suggesting that they might have a pivotal role despite the ambivalence. Children were particularly identifiable as a group perceived not to want respondents (presumably their chauffeurs, aka parents) to reduce their car use. It is notable that those who reduced their car use had a greater tendency to be neutral in terms of perceived wishes of others.

In terms of PBC there was widespread belief amongst respondents that they could catch the bus or train, or walk more, but that it would not be easy. With regard to cycling, respondents mainly perceived that they could not cycle more and that if they did it would be difficult. This suggests a significant need to raise PBC, especially self-efficacy amongst the socio-demographic group most likely to reduce their car use. It also lends support to the idea that consideration of self-efficacy as a construct in its own right within the TPB model may enhance its performance (Conner, 2003) with regard to reducing car use. The fact that cycling was seen as particularly unlikely and difficult

suggests that work to increase cycling would be least productive. It appears that walking, and public transport are both potential targets around which to base information. It is also worth noting that those who reduced their car use did not perceive the difficulty of using alternatives as much. Although they did not feel they could use alternatives to any greater extent, they may not take so much persuading if IMCs seek to overcome practical barriers.

4.4 Reliability and Validity of the TPB Data

The procedures used to consider the reliability and validity of the TPB data have been described above in Section 3.3. The results of this analysis are reported here. Cronbach's alpha values obtained for belief items and outcome evaluations making up attitudes tended towards the low side - .56 and .53 respectively. The subjective norm component values were acceptable at .95 for the normative beliefs and .89 for the motivation to comply, whilst the PBC values were slightly less than 0.75 - .72 for perceived likelihood of occurrence and .73 for perceived facilitating/inhibiting power - but not worryingly so. The intention value was also acceptable at .92.

The relatively low Cronbach's alpha values for the attitude items suggest that improvements in the statistical reliability of this variable would be beneficial (improved reliability usually results in more robust analysis later on). The re-test process results in notable improvements in the Cronbach's alpha values for the attitude items. The highest alpha value obtainable for the belief item data was 0.76. This was obtained with seven of the eleven belief items (weather, reliability, comfort, privacy, safety, convenience and accessibility). When outcome evaluations for each of these belief items were tested the alpha value was 0.71. This is slightly lower than desirable but not worryingly so. Other processes of elimination were tested, but they did not improve on this combination. This suggests that a data set based on the first re-test should be taken forward as an independent variable in the regression analysis, since this has the highest alpha values and removes least items from the attitude measure.

Whilst no more items were removed from the attitude measure than was strictly necessary, removal of any items suggested by a priori qualitative investigation casts doubt on the validity of the measure. Consequently, the attitude data was subject to exploratory factor analysis. The factor analysis did not produce a clear set of components (i.e., one obvious factor) that explained the majority of variance in the data set. Hence one could argue that eliminating any items makes the attitude measure invalid, so all attitude items measured in the questionnaire should be retained, since Aron and Aron (1998) note that Cronbach's alpha values under 0.6 can be accepted, where no alternative presents itself. If the initial Cronbach's alpha values (.56 and .53) are accepted as reliable and no items are removed, there is not a need to consider validity of the retained items in terms of being a complete measure of attitudes towards car use in the experimental context. However, the factor analysis did reveal a factor based largely, but not wholly, on the attitude components giving high reliability in the Cronbach's alpha analysis. These corresponded with internal benefits of car use and gave the Cronbach's alpha re-test results some validity. Consequently, an independent variable based on this internal benefits factor was tested in the regression analysis. Thus, an attitude variable containing all items and one comprising weather, reliability, comfort, privacy, safety, convenience and accessibility were tested. However, one must bear in mind at the interpretation stage that the attitudes in the latter are only those concerned with the benefits of car use to the individual, since the Cronbach's alpha selection eliminated items concerned with pollution and congestion, as well as expense and exercise (both disbenefits).

4.5 Reduction in Car Use

Twenty of the 31 people who returned their second travel diary had reduced their car use. A 21.4% reduction in car driver journeys was achieved in Leeds and a 19.8% decrease in Manchester. In absolute terms this is only a reduction of 50 car driver journeys, which is insignificant in comparison to the total number of such journeys undertaken in the UK each year. However, if this number were scaled up to cover a full twelve month period and the entire driving population it becomes notable. The control data did not reveal a clear pattern of reductions in car use amongst those who had not received any intervention, and therefore confirmed that change amongst the experimental group was the result of the intervention.

4.6 Multiple Regression Analysis

The TPB analysis used multiple regression to predict intentions and behaviour, i.e., reduction in car use. The data meets all the requirements of multiple regression. Enter method regression (entering all independent variables simultaneously) is used since methods that dissect the sample in any stepwise procedure are not worthwhile with so few independent variables (Joanes, 2003). The first regression model used an attitude variable based on all of the outcome beliefs and evaluations. Thus, the attitude variable included the following constructs; pollution, weather, reliability, exercise,

comfort, congestion, privacy, safety, convenience, expense and accessibility. The subjective norms variable included; partner, boss, parents, friends, colleagues and children. The PBC variable included; catching the bus, catching the train, walking and cycling. Subjective norm and PBC variables in later models always include the constructs listed here. The constructs included in the attitude variable, vary where specified.

When attitudes (including all items), subjective norms and PBC were regressed onto intentions (n=94) R was 0.52, indicating that there is a linear relationship between the dependent and independent variables. The Durbin-Watson statistic was 1.5, indicating that there is not a notable autocorrelation problem. The skewness statistic equals 0.85, indicating that the distribution of the dependent variable is normal. With regard to homoscedasticity, Tabachnick and Fiddell (2001) note that, it "is related to the assumption of normality because when the assumption of multivariate normality is met, the relationships between variables are homoscedastistic." Since the dependent variable considered here (intention) is normally distributed, we can assume that it is homoscedastistic. In addition to these conditions, it is also wise to check for multicollinearity – a relationship between the independent variables. Such a relationship makes it difficult to establish, which independent variable is having the greatest effect on the dependent variable. Multicolinearity can be identified through eigenvalues and the associated condition index. In this case, the condition index was less than 30, indicating that there is no serious multicollinearity problem.

The adjusted R^2 obtained from this model was 0.25, explaining only 25% of intentions. Nevertheless, the statistics do corroborate the initial hypothesis that subjective norms (Beta .22, t 2.31, sig 0.02) and PBC (Beta .46, t 4.84, sig <0.01) are more important in decisions to reduce car use than attitudes (Beta -.13, t –1.35, sig 0.18), as only the attitudes are insignificant. Further, PBC is the most significant with the highest Beta values, indicating that it is the most important predictor of intention to reduce car use. The relationship is also a positive one. Additionally, the value of F is significant at less than 0.01 indicating that the results probably are not due to random chance (F 10.1, $p < 0.01$).

Low adjusted R^2 values like this tell us that something important is missing from the model (Joanes, 2003). However, it is reasonable to attach value to the t statistics and their significance levels (Joanes, 2003). Thus, we can conclude from this model that the basic formulation of the TPB alone is not sufficient to explain all intentions with regard to reducing car use, but it does support the hypothesis that subjective norms and PBC need to be changed to reduce car use, not attitudes. It should be borne in mind that this may not prove to be the case amongst those who strongly believe there is no need for constraints on car use. However, these people are unlikely to voluntarily participate in an IMC and thus, they are not the focus of this study.

Given the low level of explanation of intentions, prediction of actual change in car use is unlikely to be high. This is confirmed by regression with change in car driver trips as the dependent variable. When intentions and PBC were regressed onto behaviour (n=31) using enter method regression the value of R was 0.19, indicating that there is little or no linear relationship between the dependent and independent variables. When this happens, data can be transformed until a linear relationship is obtained. However, since the TPB states that when explanation of intention is low, behaviour will not be explained (Ajzen, 1988), transforming data to obtain an explanation would not result in believable conclusions. Hence, no transformations were undertaken. The skewness statistic equals 2.4, indicating that the distribution of the dependent variable (change in car driver trips) deviates slightly from normal. The kurtosis statistic is positive (0.7) indicating that the data tends towards clustering around a central point slightly more than normal. Again, transformation is possible, but would not lead to believable conclusions. These results alone tell us that intentions to reduce car use are not leading to actual reductions, i.e., intentions are not explaining behaviour, and that those who do reduce their car use are not representative of a normal population.

The adjusted R^2 value obtained from the regression (-0.05) confirms that intentions do not explain behaviour in this case. Indeed, a negative value such as this indicates erratic behaviour (Joanes, 2003), as one might expect when there is no linear relationship. Given that the conditions for regression are not met, no importance can be attached to regression statistics. From a theoretical point of view, it is possible that the erratic behaviour identified here could be explained by the Transtheoretical Model. This is discussed in greater detail in Section 5.

Given the low levels of explanation of intentions discussed above, a key question is, 'what is missing from the basic TPB model tested here?' Some researchers, including Forward (1998) have included socio-demographic variables in their TPB regression models. This was tested here to establish whether the ability to explain intentions and behaviour was improved. The socio-

demographic variables included were age group, gender, residential location (inside or outside the city), occupation, qualifications, usual mode of transport and number of children the respondent has. Enter method regression was used to ensure comparability[3]. A model to explain intentions was tested with all socio-demographic variables included, but as one would expect with the increase in number of variables, there was an increase in adjusted R^2; but without improving other aspects of the model (n=94). When individual socio-demographic variables were added into the model, they were always insignificant. Moderate increases in adjusted R^2 were obtained when residential location, occupation, usual mode of transport and number of children the respondent has were included individually, giving values of .27, .32, .32 and .36. However, insignificant t statistics tell us that these models should be rejected, and that the addition of socio-demographic variables does not improve the performance of the model. Since a model including socio-demographics has been rejected at the stage of predicting intentions, explanation of behaviour was not attempted. Forward (1998) drew the same conclusion when testing the effect of inclusion of socio-demographic variables, and noted that this is in line with expectations since the TPB should incorporate the effects of socio-demographics in its core variables. Whilst there are differences in the behavioural contexts of the two projects, Forward's (1998) results and those obtained here suggest that in this respect at least, the TPB is performing as it should in the context of mode choice.

4.6.1 Regression with an Alternative Attitude Variable

As discussed above, the Cronbach's alpha analysis suggested an alternative formulation of the attitude variable based on items concerned with benefits of car use. Whilst it is not valid as a complete measure of attitudes towards car use, it may result in greater explanatory power due to its greater reliability, and possibly relevance to behaviour change given the explanation of variance within the attitude items and the internal benefits component identified by the factor analysis. A multiple regression model to explain intentions using an attitude variable based on the items retained by the Cronbach's alpha analysis (weather, reliability, comfort, privacy, safety, convenience and accessibility) was tested. Again, enter method regression was used (n=94). The value of R was 0.62, indicating that there is a linear relationship between the dependent and independent variables. The Durbin-Watson statistic is 1.5, indicating that there is not a notable autocorrelation problem. The skewness statistic equals 0.85, indicating that the distribution of the dependent variable is normal. Since the dependent variable considered here is normally distributed, we can therefore assume that it is homoscedastistic (Tabachnick and Fiddell, 2001). All eigenvalue condition index values are less than 30, indicating that there is no serious multicollinearity problem.

The adjusted R^2 value obtained was 0.34, indicating that thirty four percent of the variance is explained. Whilst this is greater than that for the model discussed above, it remains low, although the F value does indicate that the results are not due to random chance (F 8.6, $p < 0.01$). The statistics continue to support the hypothesis that it is not attitudes (Beta –0.11, t – 0.83, sig 0.41) that need changing for the population represented by the sample analysed here. However, it is only PBC (Beta 0.55, t 4.20, sig <0.01) that is significant in this instance (subjective norm: Beta 0.29, t 2.22, sig 0.32). As previously, one would not expect behaviour to be predicted by regression including such a poorly explained intention variable. The regression output confirms this expectation with an adjusted R^2 value of 0.17 (n=31), again suggesting erratic behaviour.

The results presented above have raised a number of interesting questions. Firstly, it is apparent that something important is missing from the model. Secondly, subjective norms were significant in one model. This is unusual, and therefore warrants further discussion and investigation. Could it be that other norms are the missing elements of the model? Thirdly, there is a suggestion that reductions in car use are erratic. Could this be explained by a behaviour change process model? Finally, what do the results say about the appropriateness of the TPB in the car use context? These questions are discussed in Section 5 below.

5 Discussion

5.1 The Role of Norms in Reducing Car Use

The research reported here has suggested that something important is missing from the TPB when it comes to explaining intentions to reduce car use. The model utilising a more complete attitude measure developed through this research hints that subjective norms are more important than is often assumed. This leads us to consider the role of norms in the TPB in greater detail. Firstly, it is apparent that the role of subjective norms in explaining intention to reduce car use should be

[3] It is worth noting here that when a stepwise model was tested, the results were no better.

investigated further, potentially through repeat research and experimentation with the way in which the subjective norm variable is defined and measured. This might take greater account of the way in which car use has become the 'norm' in Western consumer society (Maxwell, 2001). Secondly, the role of personal norms may also be worth considering.

Parker et al (1995) contest that, "as presently formulated, the TPB takes no account of the individual's personal beliefs about what is right and wrong, although personal and social normative beliefs were distinguished in Fishbein's (1967) original formulation of the TRA." (The TRA is the Theory of Reasoned Action – the precursor to the TPB, which did not included PBC.) Parker et al (1995) define personal norms as reflecting, "an individual's internalized moral rules", whilst social norms are said to reflect, "the individual's perceptions about what others would want him/her to do." Many researchers would argue that personal norms regarding a behaviour form part of an individual's attitude towards that behaviour. However, Parker et al (1995) observe that, "the procedure recommended by Ajzen and Fishbein (1980) for the elicitation of salient [attitude] beliefs does not lend itself to subjects' considering the moral implications of the behaviour in question. Thus, Parker et al (1995), and "others have continued to argue for the separation of … [personal and social] norms, particularly with reference to behaviours that have a clear moral component (e.g., Beck and Ajzen, 1991; Gorsuch and Ortberg, 1983; Pomazal and Jaccard, 1976; Schwartz and Tessler, 1972; Zuckerman and Reis, 1978)" (Parker et al, 1995).

It could easily be argued that car use has a clear moral component. Car use is now firmly embedded in Western consumer culture, and many believe they have a right to drive, suggesting that they would view requests not to drive as morally wrong. Further to this, Maxwell (2001) argues that car use is now necessitated by a range of ethics that dictate the way we behaviour towards others. For instance, cars are used to meet a range of ethical obligations relating to family, friends and work (Maxwell, 2001). Cars are used to chauffer elderly relatives around and escort children to avoid personal safety risks. Intentionally not fulfilling these obligations through car use, when an individual has the opportunity to do so is often considered wrong by the popular press and the wider population. Similarly, company cars are considered perks, and driving is the accepted method of getting to work in many workplaces; thus, not driving can easily be interpreted as somehow deviant in such environments. Thus choices regarding car use, could easily be the subject of actual or potential public opprobrium to borrow Parker et al's (1995) parlance.

Parker et al (1995) included measures of moral norm and anticipated regret to reflect individuals' personal norms in their study of intentions to commit three driving violations. They found that moral norms and anticipated regret together made additional contributions to explanation of intention over and above that explained by attitudes, subjective norms and PBC in the range of 10 to 15 per cent. Staats and Harland (1995) also found that personal norms made a significant contribution to explanation. Having established that the TPB performs as it should with regard to intentions to reduce car use, all be it with low levels of explanation, it would be interesting to establish whether the explicit inclusion of personal norms would improve the performance of the model.

If the inclusion of personal norms were to improve the performance of the model to provide explanation levels comparable with those obtained by the basic TPB in relation to behaviours such as dieting and class attendance that have weaker moral aspects (since the behaviours generally do not have the potential for significant negative impacts on others) then lack of explicit consideration of personal norms could be said to explain the relatively poor performance of the TPB in this study.

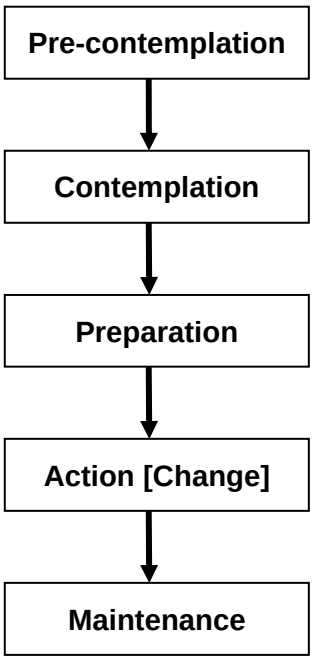
5.2 Explaining Erratic Behaviour

Further to the suggestion above that there is something important missing from the TPB model developed here, there is also a suggestion that it has not explained behaviour because the behaviour being considered is erratic. The behaviour is defined as reduction in number of car driver journeys, and from a theoretical point of view, the TPB states that reduction in car use will be the result of PBC and intentions to reduce car use formed on the basis of attitudes, subjective norms and PBC relating to reduction in car use. This is a linear model. However, Prochaska and DiClemente's (1983) Transtheoretical Model (TTM) and further work by Sutton (2001) suggests that the process of behaviour change may not be linear after all. The TTM suggests five stages in the process of behaviour change, as illustrated in Figure 3.

The original TTM was a linear model suggesting that people are initially unaware of any need to change their behaviour, that they then become aware and contemplate the need to change, then accept the need, but not change immediately, instead they move into a phase of preparing for change, then take action. However, Sutton (2001) ascertained that people cycle backwards and forwards through the stages of change. Thus, at any stage in the process of behaviour change, an

individual may regress to the previous stage or even further back before moving forwards again. This can happen any number of times over any length of time, making the process of behaviour change an iterative process of one step forwards, one step back, or one step forwards, two back before moving forwards again, by one or more stages. So, thinking about reducing car use, an individual may become aware of the need, contemplate it, accept it, prepare to reduce their car use by finding out about alternatives and planning when, where and how to catch the bus instead of driving, for example, and then catch the bus one day, but have such a bad experience that they go back to contemplating the need for change and wondering whether it is great enough to warrant the physical, cognitive and affective effort required to make the change. Over time they may move forwards again, accepting the need and preparing to try again. Having tried again, they may find the experience was positive this time around, thus, they may continue with the changed behaviour for some time. However, another bad experience may send them backwards again, but only as far as preparation, as they continue to accept the need for change (i.e., the attitude has become more fixed), but decide to try a different means of reducing their car use, e.g., cycling. This may then take some time to form into a regular pattern of changed behaviour as old habits are broken and new ones are formed.

Transtheoretical Model
Figure 3



If this cyclical process is considered in the context of the complex mix of cultural influences on car use, then it may not be surprising that the process of reducing car use is erratic. Not only does an individual have to work out which alternative(s) is appropriate for them, they may find that different alternatives are appropriate for different journeys, whilst only car use is acceptable for others; and this is against a background of some 67 different issues influencing car use decisions, as identified by Wall (2004).

This process of breaking existing habits and learning from experience suggests that these factors may also need to be considered explicitly in the operationalisation of the TPB. Theoretically it is argued that attitudes and PBC account for the affects of habit and past behaviour. However, some researchers (e.g., Staats and Harland, 1995) have found that these items add to the explanatory power of the TPB. Conversely, Forward (1998) found that explicit consideration of habit did not add significantly more than PBC to the explanation of mode choice for short trips. This inconclusive evidence suggests that attempts should be made to account for the non-linear process of reducing car use in the operationalisation of the TPB by testing the effect explicit consideration of habit and (recent) past behaviour/learning has on explanatory power. These variables should also be considered in the context of the cultural norms discussed above.

5.3 Is the TPB Appropriate for Explaining Reductions in Car Use?

The discussion here has focused on theoretical questions raised by the results of the TPB analysis carried out for the purposes of this research. The role of subjective and personal norms has been

considered, as has the potential effect of erratic behaviour on TPB operationalisation. The results and this discussion lead us to conclude that whilst the TPB is behaving as one would expect it to, the level of explanation provided is rather low. There is minimal discussion of what constitutes an acceptable level of explanation in much of the TPB research, but explanation of around 50% of intention and approximately 25% of behaviour has come to be expected. In transport studies, it has been noted that any explanation of motivations behind reducing car use, complex and multifaceted as it is, is a significant step in increasing understanding and moving forwards (Allsop, 2004). Given this, and the greater explanation provided in studies focusing on mode choice rather than reducing car use (e.g., Forward, 1998), it seems we should conclude that the TPB has made a useful contribution to understanding, by suggesting that PBC and possibly norms are more important than attitudes in achieving reductions in car use, but that the TPB's performance in this context needs to be improved. Additionally, it would be useful to test the robustness of the conclusions drawn regarding the role of PBC and subjective norms, by using them to adjust the design of a real world IMC and comparing the behaviour change achieved with that obtained by IMCs that do not have a theoretical basis.

6 Conclusions

This paper has reported on research that sought to provide an understanding of the motivations for reducing car use through an IMC. In doing so, the work has extended the use of the TPB in transport studies and considered the operationalisation of the theory in the context of reducing car use. The experimental IMCs and operationalisation of the basic TPB model have been described along with the accompanying results. The experimental IMCs were able to generate a reduction in car use amongst participants despite the small number of volunteers taking part. This allowed some explanation of intentions, but the model did not explain behaviour. Indeed, it has been suggested that car use reduction behaviour is erratic. Potential reasons for this have been discussed. Particularly, it has become apparent that something important is missing from the basic TPB model when used in the context considered here. Potentially this could be one or all of personal norms, habit, past behaviour or self-efficacy in its own right. It was concluded that the TPB has made a useful contribution to understanding car use reduction behaviour, but that there remains scope for improvement in the performance of the model. Research is needed to investigate the performance of the TPB with regard to explaining reductions in car use when operationalised to include the variables listed here. Further, the robustness of the findings regarding the role of PBC and subjective norms should be tested through further experimental IMC research – preferably with a larger sample size. A larger sample size would be desirable from a statistical point of view, but it should be noted that the numbers participating in the IMCs implemented for the purposes of this research reflects the real world response to such programmes in the UK.

References

Ahern A and O'Mahony M (2003) "The potential impacts of LUAS on the travel behaviour of the people of Dublin", (online)
http://www.tcd.ie/Transport_Research_Centre/research/potential_impact.htm (08/12/2003)

Ajzen I (1988) *'Attitudes, Personality, and Behaviour',* Open University Press, Buckingham.

Ajzen I (1991) 'The Theory of Planned Behaviour', *Organisational Behaviour and Human Decision Processes,* 50, pp 179-211.

Ajzen I and Fishbein M (1977) '*Understanding Attitudes and Predicting Social Behaviour',* Prentice-Hall, Englewood Cliffs, NJ.

Ajzen I and Fishbein M (1980) *Understanding Attitudes and Predicting Social Behavior,* Prentice Hall, Englewood Cliffs, NJ, in Parker D, Manstead ASR, Stradling SG (1995) 'Extending the Theory of Planned Behaviour: The Role of Personal Norm', *British Journal of Social Psychology,* 34, pp 127-137.

Ajzen I and Madden TJ (1986) 'Prediction of goal directed Behaviour: Attitudes, Intentions and Perceived Behavioural control', *Journal of Experimental Social Psychology,* 22, pp 453-474.

Allport GW (1935) 'Attitudes', in Murchison C (Ed), 'Handbook of Social Psychology' (Vol. 2), Clark University Press, Worchester, MA.

Allsop R (2004) personal communication.

Ampt ES and Rose G (2001) 'Travel Blending: an Australian Travel Awareness Initiative', *Transportation Research Part D: Transport and Environment,* Vol 6(2), pp 95-110.

Ampt ES and Taylor MAP (2003) 'Travelling Smarter Down Under: Policies for Voluntary Travel Behaviour Change in Australia', *Transport Policy,* Vol 10(3), pp 165-177

Anable J (2002) "Segmenting the leisure travel market using attitudinal theory", paper presented to 34th Annual UTSG Conference, Edinburgh.

Aron A and Aron EN (1998) *'Statistics for Psychology*, Prentice Hall, Upper Saddle River, New Jersey.

Bamberg S and Schmidt P (1999) 'Regulating Transport: Behavioural Changes in the Field' *Journal of Consumer Policy, 22*, 479-509.

Beck L and Ajzen I (1991) 'Predicting Dishonest Actions Using the Theory of Planned Behaviour', *Journal of Research in Personality,* 25, pp 285-301, in, Parker D, Manstead ASR, Stradling SG (1995) 'Extending the Theory of Planned Behaviour: The Role of Personal Norm', *British Journal of Social Psychology,* 34, pp 127-137.

Conner M (2003) Presentation to the Centre for Decision Research seminar series, University of Leeds.

Conner M and Norman P (2001) 'Predicting Health Behaviour', Open University Press, Buckingham.

Conner M and Sparks P (2001) 'The Theory of Planned Behaviour and Health Behaviours', in Conner M and Norman P (Eds), 'Predicting Health Behaviour', Open University Press, Buckingham.

Coolican H (1999) *'Research Methods and Statistics in Psychology'*, Hodder and Stoughton, London.

Fishbein M (1967) 'An Investigation of Relationships Between Beliefs and an Object and the Attitude Towards that Object', *Human Relationships,* 16, pp 233-240

Fishbein M and Ajzen I (1975) *'Belief Attitude Intention and Behaviour: an introduction to theory and research',* Addison-Wesley, Reading, MA.

Forward S (1998) *'Behavioural Factors Affecting Modal Choice',* Swedish National Road and Transport Institute, Linkoping, Sweden.

Gorsuch RL and Ottberg J (1983) 'Moral Obligation and Attitudes: Their Relation to Behavioural Intentions', *Journal of Personality and Social Psychology,* 44, pp 1025-1028, in, Parker D, Manstead ASR, Stradling SG (1995) 'Extending the Theory of Planned Behaviour: The Role of Personal Norm', *British Journal of Social Psychology,* 34, pp 127-137.

INPHORRM (2004) INPHORRM project website http://www.wmin.ac.uk/transport/inphormm/inphormm.htm [30/09/04].

Joanes D (2003) personal communication.

Jopson A (2003) 'Reducing Car Use: the role of The Theory of Planned Behaviour', PhD thesis, Institute for Transport Studies, University of Leeds, unpublished.

Maxwell S (2001) 'Negotiations of Car Use in Everyday Life', in Miller D (Ed) *Car Cultures,* Berg, Oxford.

Parker D, Manstead ASR, Stradling SG (1995) 'Extending the Theory of Planned Behaviour: The Role of Personal Norm', *British Journal of Social Psychology,* 34, pp 127-137.

Parker D, Manstead ASR, Stradling SG and Reason JT (1992a) 'Determinants of Intention to Commit Driving Violations', *Accident Analysis and Prevention,* Vol. 24, No. 2, pp. 117-131.

Parker D, Manstead A, Stradling SG, Reason J and Baxter J (1992b) 'Intention to Commit Driving Violations: an application of the Theory of Planned Behaviour' *Journal of Applied Psychology* Vol. 77, No. 1, pp 94-101.

Pomazal RJ and Jaccard JJ (1976) 'An Informational Approach to Altruistic Behaviour', *Journal of Personality and Social Psychology,* 33, pp 317-326, in, Parker D, Manstead ASR, Stradling SG (1995) 'Extending the Theory of Planned Behaviour: The Role of Personal Norm', *British Journal of Social Psychology,* 34, pp 127-137.

Prochaska J and DiClemente C (1983) 'Stages and Processes of Self-Change of Smoking: Towards An Interactive Model of Change', *Journal of consulting and Clinical Psychology,* 51(3), 390-395.

Staats HJ and Harland P (1995) *'A Longitudinal Study on the Effects of the Eco Team Program on environmental Behaviour and its Psychological Backgrounds',* Summary Report, Centre for Energy and Environmental Research, Faculty of Social and Behavioural Sciences, Leiden University, Netherlands.

Schwartz SH and Tessler RC (1972) 'A Test of a Model for Reducing Measured Attitude-Behavior Inconsistencies', *Journal of Personality and Social Psychology,* 24, pp 225-236, in, Parker D, Manstead ASR, Stradling SG (1995) 'Extending the Theory of Planned Behaviour: The Role of Personal Norm', *British Journal of Social Psychology,* 34, pp 127-137.

Steer Davies Gleave (1998) *'Leeds Travel Blending Final Report',* Steer Davies Gleave, London.

Stradling SG and Parker D (1997) 'Extending the Theory of Planned Behaviour: Attitudes to Speeding and Other Violations', paper presented to British Psychological Society Annual Conference, Edinburgh, 3-6th April 1997.

Sutton S (2001) 'Back to The Drawing Board? A Review of Applications of The Transtheoretical Model to Substance Use', *Addiction,* Vol. 96, pp 175-786.

Tabachnick B and Fidell L (2001) *Using Multivariate Statistics,* Fourth Edition, Allyn and Bacon, Needham Heights, MA.

TAPESTRY (2004) TAPESTRY project website http://www.eu-tapestry.org/ [30/09/04].
Wall (2004) Presentation to 3rd International Conference on Traffic and Transport Psychology, Nottingham, UK, 5th-9th September.
Wicker AW (1969) 'Attitude Versus Action: The Relationship of Verbal and Overt Behavioural Responses to Attitude Objects', *Journal of Social Issue,* Vol 24(4) pp 41-78.
Zuckerman M and Reis H (1978) 'Comparison of Three Models for Predicting Altruistic Behaviour', *Journal of Personality and Social Psychology,* 36, pp 498-510, in, Parker D, Manstead ASR, Stradling SG (1995) 'Extending the Theory of Planned Behaviour: The Role of Personal Norm', *British Journal of Social Psychology,* 34, pp 127-137.