Public transport information (non-)use empirically investigated for various trip types

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ABSTRACT
What influences the (non-)use of pre-trip public transport (PT) information for various types of trips? This question is considered for leisure trips, business trips, and trips to unfamiliar destinations. Additionally, the use of PT information to compare car with public transport is investigated. The research has focused on: travel behaviour, travel attitudes, information factors, social surrounding, and sociodemographics. A postal survey was sent to a random sample of 10,000 households in Bristol and Manchester, UK. The response rate was 13% (n=1327). Structural equation modelling has been used to investigate interdependencies among the factors studied. The results show that all investigated factors are related to pre-trip PT information (non-)use, regardless of trip type. It seems that PT information use is more about 'the person' than the trip. Public transport use and PT *information* use are closely connected, with travel behaviour having a stronger impact on information use than vice versa. Infrequent public transport users consult PT information less often than frequent public transport users. Males consult PT information less often than females, as do lowly educated persons and people without Internet access at home. Respondents who were recommended to use certain PT information services by people they know consult PT information more often than others. Respondents who dislike looking up train information and who find it difficult to consult online travel information use PT information less often than others. Policy makers and information service providers should take a more holistic view by marketing PT information and public transport use simultaneously.

1 INTRODUCTION

Transport policy in many countries has placed increasing importance on influencing people's mode choice. Accordingly, there has been a continued growth and investment in the provision of public transport (PT) information services. Yet relative to total travel, usage of PT information services can seem disappointingly low and it seems that awareness does not necessarily lead to use (*1, 2*). Thus, what affects the use of PT information has become a key consideration.

There has been a lot of attention in academic literature regarding the use of ATIS (Advanced Traveller Information Services) and their effect on car drivers' propensity to change their route or mode for, mostly, familiar trips (*3, 4*). Relatively less attention has been paid to pre-trip PT information use and journey planning (*4*). Most PT information is likely to be collected pre-trip, when decisions about travel mode are made (*5*). Although some studies have investigated the requirements for PT information via stated needs (*5-7*) only a few empirical studies exist that deal with revealed needs and use of PT information (*8-10*). Moreover, these studies are descriptive rather than explanatory (*8-10*).

The goal of this paper is to provide insight into factors affecting the (non-)use of pre-trip PT information for: 1) various trip types, and 2) the specific purpose of comparing car with public transport (and its consequences for mode choice). Regarding the potential of PT information use to bring about a modal shift from car to public transport, expectations are moderate (*4, 11, 12*). PT information use may reinforce public transport decisions rather than bring them about (*8*). In this research, specific attention has been paid to the direction of influence between public transport use and PT *information* use, since this could have important consequences for policy makers and transport professionals.

The following three trip types (all concerning travel within the UK) were investigated: 1) long distance (over 50 miles) leisure trips, 2) long distance business trips, and 3) unfamiliar trips (these could be either short or long distance). The frequency of consulting PT information with the intention to compare car with public transport was studied for unfamiliar and any long distance journeys. These trip types were chosen because previous research has shown that people acquire PT information mostly for unfamiliar trips, arrival time-sensitive trips (such as business trips), longer distance trips, and leisure trips (*1, 8, 9, 13*).

Data were collected via a postal survey that was sent to a random sample of 10,000 households in the city of Bristol and the Greater Manchester area, UK. The response rate was 13% (n=1327). Structural Equation Modelling (SEM) was employed to investigate assumed interdependencies among the factors studied and to gain more insight into the direction of influence between public transport use and PT information use. In SEM, a variable can be both an outcome variable and an explanatory variable at the same time. SEM also enables the relationships between variables to be decomposed into total, direct, and indirect effects (*14*).

In the next section a hypothetical model and some hypotheses are presented which have guided the analyses. This is followed by the methodology in section 3. The results are given in section 4 and their implications are discussed in section 5.

2 HYPOTHETICAL MODEL

Figure 1 presents the hypothetical model that has guided our analyses. Based on previous research (*8-11, 13, 15, 16*), the following factors have been studied:

1. Travel behaviour (frequency of car use and public transport use),
2. Travel attitudes (towards car and public transport),
3. Information factors (e.g., ease of obtaining and understanding, and trusting PT information via Internet, telephone, and timetables),
4. Social surrounding (e.g., knowing people who use public transport, recommendation of PT information services by others),
5. Sociodemographics (e.g., gender, age, education, income, Internet access).

The focus was on explaining pre-trip public transport information use and information factors (e.g., ease of obtaining, understanding, and trusting PT information). For simplicity, we have only depicted one-way arrows, but two-way relationships have also been studied (i.e., two factors affect each other simultaneously), as well as 'reverse' relationships (e.g., the effect of PT information use on travel behaviour).

The diagram shows that we do not expect a direct effect of sociodemographics on PT information use, but an indirect effect via travel behaviour (frequency of car use and public transport use), travel attitudes (towards car and public transport), and information factors. Sociodemographics could be poor proxies for the underlying behavioural and attitudinal characteristics of individuals which may determine travel information use (*3*). All other factors are expected to have both direct and indirect effects on PT information use.

A US study found that those who tend to be more aware of, and also use more often, online information for either car or public transport are: young, professionals, people with Internet access, and public transport users (*15*). The latter finding might indicate that people who rarely travel by public transport are less likely to use PT information compared to frequent public transport users. Holding negative attitudes towards travelling by public transport might be one of the reasons why people choose not to do so. This could also directly and indirectly (see Figure 1) affect their propensity to use PT information. Also, social surrounding might affect individuals' travel choices and their PT information use. Probably, many people do not reach their travel decisions entirely alone, but operate in a social context and are influenced by the behaviour and opinions of other people around them. Finally, difficulties with consulting and trusting PT information could be an important barrier for using PT information.

We hypothesize that persons who rarely or never use PT information are individuals who:

- have a negative attitude towards public transport,
- rarely travel by public transport,
- find it difficult to consult PT information,
- do not know many people who use public transport,
- have not received any recommendations by others to use PT information services.

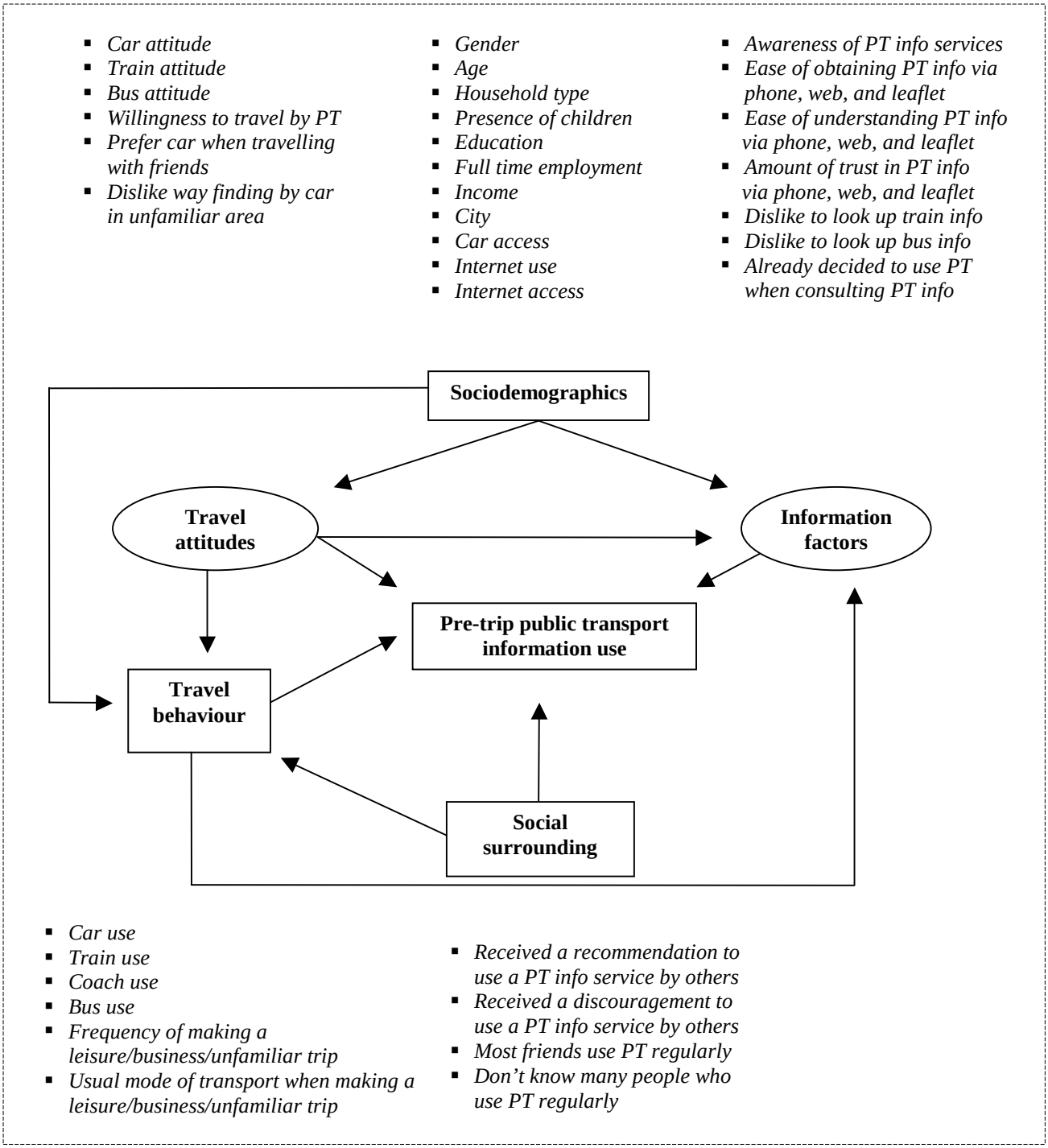


FIGURE 1 **Hypothetical model explaining pre-trip public transport information use and information factors (researched variables are in italics)**

3 RESEARCH DESIGN AND METHODOLOGY

3.1 Data Employed

A travel information survey was designed and piloted among fifty people. The main topics covered were: personal travel behaviour, public transport information awareness and use, attitudes towards travel and PT information use, and sociodemographics. The questionnaire took approximately twenty minutes to fill out. A random sample of 10,000 households in Bristol (5,000) and Greater Manchester (5,000) in the UK was then selected via the municipalities' population administration and received the postal survey at the beginning of December 2007. A post card reminder was sent two weeks later. Only one person aged 18 or over could participate per household. The overall response rate was 13% (n=1327). The questionnaire could also be filled out online by those receiving an invitation to participate, but only 6% of the total response sample did so.

Two different cities were researched to potentially capture different experiences with and attitudes towards public transport and PT information use. Compared to Bristol (population 410,500 (*17*)), Manchester (population 442,100 (*18*)) has a more extensive public transport system including a tram service and a light rail system. Also, bus use is cheaper (shuttle buses with three different routes operating in the city centre of Manchester are even free to use). Consequently, bus use is higher in Manchester than in Bristol: nearly a quarter (22%) of Mancunians travel to work by bus, while only 13% of Bristolians do so (*17, 18*). The latter drive and walk more often to work than Mancunians (*17, 18*).

Nearly two-thirds of all respondents (65%) live in the city of Bristol and 64% of the Mancunians live in the city of Manchester, so the majority of respondents are urban residents. Just over half (54%) of respondents are under fifty years old. In the total sample, 43% are employed full time, 16% part time, and 26% are retired. One-third of the sample are single, while over a quarter (28%) have children. Nearly one-fifth (18%) of the respondents do not hold a driving licence and nearly a quarter (22%) do not have access to a car in their household for personal use. Overall, 28% of British adults do not hold a driving licence (*19*). More information about the sample and the operationalisation of variables included in the analyses can be found in Table 1.

To give an indication of the representativeness of our sample we compared it with census data for Bristol and Manchester (*17, 18*). Our sample is characterised by an over-representation (ranging between 5% and 9%) of females, older persons, highly educated persons, and individuals who have access to at least one car in their household. Although these differences should be kept in mind they do not compromise the study's purpose to better understand how various types of factors are related to PT information use.

Table 1 Frequency Distribution and Definition of Variables

Variables		N	%	Mean	SD
Pre-trip public transport information use					
How often do you consult public transport information *before* you make the following types of journeys within the UK?					
A leisure trip of over 50 miles within the UK	1 = Always	1162	30		
	2 = Very often		12		
	3 = Quite often		9		
	4 = Sometimes		20		
	5 = Never		28		
A business trip of over 50 miles within the UK	1 = Always	429	40		
	2 = Very often		17		
	3 = Quite often		7		
	4 = Sometimes		16		
	5 = Never		20		
A trip to an unfamiliar destination within the UK (this could be a local trip)	1 = Always	1185	33		
	2 = Very often		13		
	3 = Quite often		10		
	4 = Sometimes		23		
	5 = Never		21		
How often do you obtain public transport information to *compare* car with public transport for unfamiliar or long distance (=over 50 miles) journeys?	0 = Compares at least sometimes car with public transport	1025	57		
	1 = Never compares car with public transport		43		
Travel behaviour					
How often do you normally travel using the following types of transport?					
Car or van (as driver)	0 = Less often or never	1283	29		
	1 = At least once a week		71		
Train	1 = At least once a month	1157	19		
	2 = At least once every 3 months		17		
	3 = At least once a year		27		
	4 = Less often or never		37		
Coach	1 = At least once every 3 months	1073	11		
	2 = At least once a year		26		
	3 = Less often or never		63		

Table 1 Continued (1)

Variables		N	%	Mean	SD
Travel behaviour (continued)					
How often do you normally travel using the following types of transport?					
Bus	1 = 3 days a week or more	1239	19		
	2 = At least once a week		12		
	3 = At least once every 2 weeks		8		
	4 = At least once a month		10		
	5 = At least once every 3 months		16		
	6 = At least once a year		14		
	7 = Less often or never		21		
How do you normally make the following types of trips?					
A leisure trip of over 50 miles within the UK	1 = Mostly by car	1144	63		
	2 = Sometimes by car, sometimes by public transport		20		
	3 = Mostly by public transport		17		
A business trip of over 50 miles within the UK	1 = Mostly by car	429	48		
	2 = Sometimes by car, sometimes by public transport		18		
	3 = Mostly by public transport		34		
A trip to an unfamiliar destination within the UK (this could be a local trip)	1 = Mostly by car	1197	62		
	2 = Sometimes by car, sometimes by public transport		21		
	3 = Mostly by public transport		17		
Travel attitudes					
I like travelling by car (either as driver or passenger)	1 = Strongly disagree, 7 = Strongly agree	1284		5.70	1.59
My experience of travelling by car (either as driver or passenger) is good	1 = Strongly disagree, 7 = Strongly agree	1262		5.15	1.59
I like travelling by train	1 = Strongly disagree, 7 = Strongly agree	1230		4.67	1.98
My experience of travelling by train is good	1 = Strongly disagree, 7 = Strongly agree	1218		4.73	1.67
I like travelling by local bus	1 = Strongly disagree, 7 = Strongly agree	1238		3.51	2.10
My experience of travelling by local bus is good	1 = Strongly disagree, 7 = Strongly agree	1207		3.53	1.97
If I am travelling with friends I prefer to go by car rather than by public transport	1 = Strongly disagree, 7 = Strongly agree	1265		5.09	1.89
If I am travelling to an unfamiliar destination, I will consider going by public transport	1 = Strongly disagree, 7 = Strongly agree	1041		3.93	2.19
If I think that it might be difficult or expensive to park at my destination, I will consider going by public transport	1 = Strongly disagree, 7 = Strongly agree	1028		4.88	2.01

Table 1 Continued (2)

Variables		N	%	Mean	SD
Information factors					
Have you heard of any of the following websites or phone services for public transport information? (National Rail Enquiries, Traveline, National Express, Trainline, Transport Direct, Transport for London)	Continuous Minimum = 0, Maximum = 8	1292		3.96	2.24
Even if you might never use it, how easy would you / do you find it to *obtain* public transport information via a website before you travel?	1 = Very difficult, 7 = Very easy	1156		5.20	2.02
Even if you might never use it, how easy would you / do you find it to *understand* a website for public transport information?	1 = Very difficult, 7 = Very easy	1178		5.21	2.03
Even if you might never use it, how much would you / do you *trust* a website for public transport information?	0 = Not at all, 10 = Very much	1189		6.53	2.93
I dislike looking up train information	1 = Strongly disagree, 7 = Strongly agree	1227		3.67	1.94
When I look up public transport information I have already decided to use public transport	1 = Strongly disagree, 7 = Strongly agree	1166		4.93	1.94
Social surrounding					
Have other people (for example, colleagues, family, or friends) ever *recommended* the use of a particular PT information service to you?	0 = No 1 = Yes	1305	75 25		
I do not know many people who use public transport regularly	1 = Strongly disagree, 7 = Strongly agree	1271		4.17	2.11
Most of my friends use public transport regularly	1 = Strongly disagree, 7 = Strongly agree	1262		3.20	1.88
Socodemographics					
Gender	0 = Male 1 = Female	1291	42 58		
Age	Continuous, Minimum = 18, Maximum = 95	1278		48.96	16.79
Education	1 = Low (no qualifications, O-level, GCSE-grade) 2 = Medium (A-level, vocational training) 3 = High (academic degree)	1263	32 27 41		
Income (=monthly net household income)	1 = Low (l970 or less US dollars) 2 = Medium (1970 – 5908 US dollars) 3 = High (5908 or more US dollars)	1095	26 47 27		
Frequency Internet use for work and/or personal reasons	1 = Daily Internet use 2 = Weekly Internet use 3 = Monthly Internet use or less often 4 = Never uses Internet	1301	56 17 6 21		
Internet access at home	0 = Yes 1 = No	1300	73 27		
City	0 = Bristol 1 = Manchester	1323	65 35		

3.2 Operationalisation of variables and sample differences

Respondents answered the following question about their PT information use for leisure, business, and unfamiliar trips: "How often do you consult public transport information *before* you make the following types of journeys within the UK?". Those respondents who indicated that they never make such journeys were excluded from the analyses. Only respondents holding a driving licence or having access to a car in their household were included in the analysis of PT information use with the purpose of comparing travel by car with public transport. In the questionnaire, public transport was defined as train, coach, bus, tram, and underground, while excluding taxi and air travel. The precise nature of PT information use was not defined, allowing coverage of various information sources (e.g., timetables, telephone, Internet) and various types of information (e.g., confirmatory information such as departure times, information about travel modes for journey planning). An empirical investigation of the use of various PT information types and sources can be found elsewhere (*13*).

The trip distinctions used here (i.e., leisure, business, unfamiliar trip) are not mutually exclusive - for instance respondents are likely to have accounted for experience with some business and leisure tripmaking when answering the question about PT information use for unfamiliar trips. Moreover, any trip type or category will contain a range of more specific journey contexts – as explored by Mokhtarian et al. (*20*) in the case of leisure trips. Nevertheless, the researched trip types are assumed to differ at least to some extent in trip purpose, distance, level of familiarity, and arrival time-sensitivity.

The answer categories of the question about getting a PT information service recommended by others (see Table 1) were divided into: "yes" and "yes, but I can not remember the information service(s)". They were collapsed into one category for the analysis. Half of the respondents who answered positively, indicated they could not remember the PT information service they had been recommended.

The sample of respondents who answered the question about using PT information to compare car with public transport (n=1003), contains relatively more persons who are highly educated (47%) and have a high income (33%) compared to the whole sample. Also, more respondents in this sample use the Internet daily (65%) and have Internet access at home (81%). The other samples used in the analyses for leisure and unfamiliar trips closely resemble the main sample reported in Table 1, but have less respondents who never use the Internet (17% and 15% respectively). Respondents who make business trips (n=429) differ as follows from the overall sample (whose percentages are given in brackets):

- 53% are female (58%),
- average age is 42 years old (standard deviation is 11 years) (mean=49, sd=16),
- 64% are highly educated (41%),
- 47% have a high income (27%),
- 85% use the Internet daily (56%),
- 89% have Internet access at home (73%),
- 94% hold a driving licence (82%),
- 12% do not have access to a car in their household (22%).

Furthermore, respondents who make business trips travel more often by car in general (83% at least weekly) and train (29% at least monthly) compared to the sample as a whole.

As can be seen in Figure 1, several variables were used to measure each type of factor (for example, travel attitudes). Figure 2 (see Section 4.4) clarifies which variables were studied, but were not found to be statistically significant. Their lack of explanatory power might be partly explained by multicorrelinearity amongst the included variables. For example, a dislike to consult bus information could be correlated with a dislike to consult train information, causing only one of these two variables to have an effect on PT information use.

3.3 Method of Analysis

We chose SEM as our method of analysis because of the assumed interdependencies between the various factors studied and to better understand directions of influence. In SEM, a variable can be both dependent (that is, an outcome variable) and independent (that is, an explanatory variable) at the same time. Moreover, SEM distinguishes between direct, indirect, and total effects (*14*). A total effect consists of one direct and one or more indirect effects. An SEM analysis consists of two parts: a measurement model and a structural model. In the measurement model, latent variables are explained by their indicators (observed variables). In the structural model, relationships between the latent variables can be modelled. The structural model captures the regression effects of exogenous (independent) variables on endogenous (dependent) variables, and the regression effects of endogenous variables on each other.

Covariance analysis was used to estimate the coefficients in an SEM model. A model covariance matrix was fitted on a sample covariance matrix, while iteratively minimizing the differences between the model-implied and observed values. Maximum likelihood estimation was used as the method of estimation. In addition to a covariance matrix, an asymptotic covariance matrix was calculated as input for the analysis. In this way, standard errors and chi-squares were corrected for non-normality (*21*). A disadvantage of constructing an asymptotic covariance matrix is that a listwise deletion procedure is applied, which resulted in many missing cases (18%). Therefore, we imputed values for missing items using the technique of Expectation Maximization (EM), which substitutes values for missing data through a maximum likelihood estimation procedure (*22*). Non-recursive structural equation models with latent variables were estimated using LISREL software version 8.72 (*14*). A measurement model for travel attitudes and information factors was developed. In the structural model, parameters were estimated of the relationships between the endogenous and exogenous variables, and among the endogenous variables. The measurement model and the structural model were estimated simultaneously.

There are several goodness-of-fit measures that can be used to assess the outcome of an SEM analysis. Frequently-used measures include (*23*): the root mean square error of approximation (RMSEA), which is based on chi-square values and measures the discrepancy between observed and predicted values per degree of freedom (a good model has an RMSEA value of less than 0.05); the comparative fit index (CFI), which compares the proposed model with a baseline model with no restrictions (a good model should exhibit a value greater than 0.90); the consistent Akaike information criterion (CAIC), which compares the model fit with the degree of parsimony of the model (the smaller the value, the better); and goodness-of-fit measures, which compare the sample and model-implied variance-covariance matrices, such as the standardized root mean square residual (SRMR) (a value less than 0.05 is considered a good fit) and the adjusted goodness-of-fit index (AGFI) (the greater the value, the better the fit). Another goodness of fit measure is the Satorra-Bentler chi-square, which takes non-normality into account by using an asymptotic covariance matrix (*21*). Squared multiple correlations (R^2) give insight into the proportion of explained variance of the dependent variables included in the model.

It has to be noted that a direct comparison of goodness-of-fit indicators between the models for different trip types is very difficult due to the varying sizes of the covariance matrices that are estimated (the sizes of these matrices differ because diverse samples are considered in each model). This means that it is difficult to assess which model explains PT information use best. Standardized coefficients are given in Table 2 (see Section 4) to enable comparisons of the magnitude of the effects.

4 RESULTS

4.1 Leisure and Unfamiliar Trips

Less than half of all respondents (46%) said they consulted PT information very often or always before making an unfamiliar trip and 42% said they did so before making a leisure trip (see Table 1). Furthermore, over a quarter (28%) of all respondents indicated they never consulted PT information before making a leisure trip, while 21% never did this for unfamiliar trips. As Table 2 shows, the (non-)use of PT information before going on a leisure trip or an unfamiliar trip is explained by the same set of factors. The indices of overall model fit show that both models perform well (respectively RMSEA=0.017, CFI=0.998; RMSEA=0.022, CFI=0.997). Reliability analysis using Cronbachs' alpha showed that most respondents gave very similar answers regarding their PT information (non-)use for leisure and unfamiliar trips (Cronbachs' alpha=0.853). This high degree of consistency might partly be attributed to difficulties in making clear distinctions between trip types (in a context where past behaviour over a number of trips is being considered) - as discussed in Section 3.2.

The usual mode for making leisure and unfamiliar trips has the strongest direct effect on PT information use. Respondents who usually travel by car consult less often PT information. This finding is consistent with earlier research showing how habit can limit the chance that an alternative transport choice is considered (*16, 24*). Additionally, people might know or think that public transport is not a viable option for most of their trips and, therefore, refrain from consulting PT information. Overall, the effects of travel attitudes, information factors, and social surrounding on PT information use are approximately of the same strength (see Table 2). Respondents with a positive car attitude and who prefer the car when travelling with friends consult PT information less often than others. Also, respondents who dislike looking up train information, consult less often PT information for leisure and unfamiliar trips than respondents who do not have such a dislike. Social surrounding seems to matter for PT information use: respondents who received a recommendation to use certain PT information services consult more often PT information before making leisure and unfamiliar trips than respondents who never got such a recommendation.

Investigation of the direction of influence between public transport use and PT *information* use revealed that a two-way interaction exists. However, overall, the best results were obtained by modelling public transport use as affecting PT information use. It seems that because respondents use public transport frequently, they consult PT information more frequently compared to respondents who use public transport infrequently or never. Similarly, Goulias et al. (*15*) found that public transport use increases awareness and use of online travel information.

Contrary to our expectations, direct effects of sociodemographics on PT information use were found, which are stronger than the effects of most other factors. Highly educated persons consult more often information, as do females, and persons with Internet access at home. The latter result is understandable in its direct effect, but we had expected that education and gender would only have indirect effects via travel behaviour, travel attitudes, and information factors. Even after controlling for frequency of public transport use in the analysis, an effect of education and gender is found on PT information use. Possibly, some important factors have been overlooked that might explain why there still is a direct effect of sociodemographics on PT information use. For example, perhaps the gender effect is related to feelings of control (*25*), with women preferring to be well-organised and to plan ahead more often than men. Only age has, as supposed, an indirect effect on information use. However, the total effect is statistically insignificant, because younger persons dislike consulting train information, but meanwhile have received more often a recommendation to use a particular PT information service than older persons. These two contrasting effects lead to a zero total effect of age on PT information use.

Table 2 Standardized Coefficients of Direct and Total[1] Effects for Leisure, Business, and Unfamiliar Trips, and for Comparing Car with Public Transport (significance at least $p < 0.05$, unless indicated otherwise[2])

	LEISURE TRIPS (N=1136)	UNFAMILIAR TRIPS (N=1161)	BUSINESS TRIPS (N=429)	COMPARE CAR WITH PT (N=1003)
Measurement model				
Car attitude				
I like travelling by car	0.901			
Good experience car travel	0.636			
Bus attitude				
I like travelling by local bus	0.973	0.967		
Good experience local bus travel	0.677	0.689		
Public transport attitude				
If unfamiliar destination, will consider going by public transport				0.799
If parking difficult, will consider going by public transport				0.644
Ease of consulting PT info online				
Ease of obtaining PT info	0.936	0.939		0.930
Ease of understanding PT info	0.948	0.951		0.948
Amount of trust in PT info	0.776	0.783		0.784

[1] Total effects are in *italic*

[2] [a]= significant at $p < 0.10$, [b]= not significant

Table 2 Continued (1)

	LEISURE TRIPS (N=1136)			UNFAMILIAR TRIPS (N=1161)			BUSINESS TRIPS (N=429)			COMPARE CAR WITH PT (N=1003)		
Structural model	**Dependent variables**			**Dependent variables**			**Dependent variables**			**Dependent variables**		
Explanatory variables	**PT info[3]**	**Dislike**	**Recom**	**PT info**	**Dislike**	**Recom**	**PT info**	**Dislike**	**Know**	**PT info**	**Online**	**Decided[4]**
Information factors												
PT info: Never consults PT info to compare car with PT												0.279
												0.279
Dislike: Dislike looking up train information	0.076			0.125			0.088					
	0.076			*0.125*			*0.088*					
Online: Easy to consult PT information online		-0.284			-0.277					-0.051[b]		
	-0.022[a]	*-0.284*		*-0.035*	*-0.277*					*-0.051[b]*		*-0.014[b]*
Awareness of PT info services											0.135	
										-0.007[b]	0.135	*-0.002[b]*
Social surrounding												
Recom: Got a recommendation to use a particular PT info service	-0.071			-0.092						-0.171		
	-0.071			*-0.092*						*-0.171*		*-0.048*
Know: I do not know many people who use PT regularly							0.148	0.218				
							0.167	*0.218*				
Most friends use PT regulary				-0.075[a]								
				-0.075[a]								
Travel behaviour												
Public transport is the usual mode for making this type of trip	-0.478			-0.310			-0.524					
	-0.478			*-0.310*			*-0.524*					
Train use (infrequent or never)	0.054[a]	0.243	-0.131	0.040	0.226	-0.128		0.176	0.194	0.275		
	0.082	*0.243*	*-0.131*	*0.040*	*0.226*	*-0.128*	*0.048*	*0.218*	*0.194*	*0.275*		*0.077*
Coach use (infrequent or never)	0.096		-0.106[a]	0.090		-0.102[a]						
	0.104		*-0.106[a]*	*0.099*		*-0.102[a]*						
Bus use (infrequent or never)				0.087								
				0.087								
Car use (weekly)									0.275	-0.158		
							0.046	*0.060*	*0.275*	*-0.158*		*-0.044*

[3] PT info = Frequency of consulting PT information before making this type of trip / Frequency of obtaining PT information to compare car with public transport (1=always, 5=never)

[4] Decided = When I look up public transport information I have already decided to use public transport (1=strongly disagree, 7=strongly agree)

Table 2 Continued (2)

	LEISURE TRIPS (N=1136)			UNFAMILIAR TRIPS (N=1161)			BUSINESS TRIPS (N=429)			COMPARE CAR WITH PT (N=1003)		
Structural model	**Dependent variables**			**Dependent variables**			**Dependent variables**			**Dependent variables**		
Explanatory variables	**PT info**	**Dislike**	**Recom**	**PT info**	**Dislike**	**Recom**	**PT info**	**Dislike**	**Know**	**PT info**	**Online**	**Decided**
Travel attitudes												
Positive car attitude	0.121[a]											
	0.121[a]											
Positive bus attitude			0.099			0.100						
	-0.007[a]		*0.099*	*-0.009*		*0.100*						
Positive public transport attitude										-0.254		0.270
										-0.254		*0.199*
Prefer to go by car when travelling with friends				0.098[a]								
				0.098[a]								
Sociodemographics												
Female	-0.136			-0.096			-0.164			-0.071		
	-0.136			*-0.096*			*-0.164*			*-0.071*		*-0.020*
Age		-0.142	-0.142		-0.141	-0.145					-0.174	
	-0.001[b]	*-0.142*	*-0.142*	*-0.004*[b]	*-0.141*	*-0.145*				*0.009*[b]	*-0.174*	*0.002*[b]
High education	-0.177			-0.226						-0.216	-0.071[a]	
	-0.177			*-0.226*						*-0.220*	*-0.071*[a]	*-0.061*
High income										0.128		
										0.128		*0.036*
Infrequent Internet user / non-user							0.229					
							0.229					
No Internet access at home	0.093			0.115							-0.541	
	0.093			*0.115*						*0.028*[b]	*-0.541*	*0.008*[b]
Manchester resident									-0.165			
							-0.027[b]	*-0.036*[b]	*-0.165*			

Table 2 Continued (3)

Structural model	LEISURE TRIPS (N=1136)			UNFAMILIAR TRIPS (N=1161)			BUSINESS TRIPS (N=429)			COMPARE CAR WITH PT (N=1003)		
	Dependent variables			Dependent variables			Dependent variables			Dependent variables		
	PT info	Dislike	Recom	PT info	Dislike	Recom	PT info	Dislike	Know	PT info	Online	Decided
Goodness of fit indicators												
R^2 (reduced form)	0.476	0.141	0.078	0.367	0.130	0.079	0.531	0.184	0.061	0.395	0.034	0.511
Degrees of freedom		68			65			14			56	
Satorra-Bentler χ^2		91.288			100.842			12.074			56.934	
p-value Satorra-Bentler χ^2		0.031			0.003			0.600			0.440	
SRMR		0.026			0.022			0.034			0.025	
RMSEA		0.017			0.022			0.000			0.004	
p-value for RMSEA < 0.05		0.356			0.223			0.350			0.436	
CFI		0.998			0.997			1.000			1.000	
AGFI		0.938			0.932			0.942			0.941	
Independence CAIC		10120.230			11948.892			1487.705			8991.005	
Model CAIC		954.206			1129.759			321.317			832.372	
Saturated CAIC		1229.396			1377.753			388.380			1075.862	

Determinants of information factors (the dislike to look up train information) and social surrounding (receiving a recommendation to use a certain PT information service by others) have been studied as well. Respondents having difficulties consulting PT information online dislike looking up train information, which results in less PT information use. Also, respondents who hardly or never travel by train dislike looking up train information. This might imply a learning effect: the more often one travels by public transport, the more proficient one gets in consulting PT information. Similar results have been found in previous research (*26*). We did not find evidence for the reverse (because people dislike consulting train information they travel less by train), which supports earlier research concerning bus travel (*10*).

Social surrounding and travel behaviour mutually affect each other, but the effect of travel behaviour on social surrounding is stronger than the other way round. Respondents who received a recommendation to use a particular PT information service use public transport more frequently and have a more positive attitude towards bus travel than those who did not receive such a recommendation. This seems to suggest that one has to be receptive for such recommendations both by travel behaviour (i.e. use public transport) and travel attitudes. People, perhaps, who need PT information (because they travel more frequently by public transport) remember more often that they received a recommendation compared to others, or they might actively have sought a recommendation about PT information services from people they know.

Overall, the results for leisure and unfamiliar trips are very similar. Travel behaviour and sociodemographics have the strongest relationships with pre-trip PT information (non-)use. If the car is the usual mode of transport for making leisure and unfamiliar trips, PT information is less often consulted for these trip types. Respondents who consult less often PT information travel infrequently or never by public transport, have a positive car attitude, are lowly educated, male, do not have Internet access at home, and have never received a recommendation to use a particular PT information service by others. As expected, respondents who find it difficult and dislike consulting PT information, do so less often before making a leisure or unfamiliar trip.

4.2 Business trips

Respondents consult PT information relatively more often before making business trips: 57% of the respondents who make such trips said they consulted PT information very often or always (see Table 1). Nevertheless, one-fifth of respondents stated they never consulted PT information before making a business trip. Indices of model fit show that the model performs well (RMSEA=0.000, CFI=1.000) (see Table 2).

Similar results have been obtained for business trips as compared to leisure and unfamiliar trips, showing that the strongest factors related to pre-trip PT information (non-)use are travel behaviour and sociodemographics, regardless of trip type. However, a different indicator of social surrounding affects the use of PT information for business trips, namely not knowing many people who use public transport regularly. Including business trips in the reliability analysis showed that most respondents gave very similar answers across all three trip types (Cronbachs' alpha=0.879), indicating a high degree of consistency regarding their PT information (non-)use for each trip type. The potential overlap between unfamiliar trips and business trips might be partly causing this high degree of consistency. Even so, it could also mean that PT information use is more about 'the person' than about the type of trip that is being made. Especially, since travel behaviour and sociodemographics are relatively strong factors related to PT information use.

Respondents who normally travel by car when making a business trip and who infrequently or never travel by train consult less often PT information. The effect of train use on PT information use is indirect and happens via the dislike to look up train information and via not knowing many people who use public transport regularly (both of these factors have a negative effect on PT information use for business trips). Not only do respondents who dislike consulting train information travel infrequently (or never) by train, they also state more often than others that they do not know many people who use public transport regularly. Again, this might suggest that consulting PT information is a learning process in which social surrounding could be helpful. Additionally, Cain (*10)* found that public transport users have more often previous experience with consulting PT information compared to non-users of public transport, which might make it easier for the former to understand PT information.

Respondents who say they do not know many people who use public transport regularly are frequent car users, rarely or never travel by train, and tend to live in Bristol. The latter finding matches the lower usage of buses in Bristol compared to Manchester. However, Bristolians do not consult PT information less often than Mancunians, since the total effect of city on PT information use is not statistically significant (see Table 2). Finally, males and respondents who use the Internet less frequently consult PT information less often.

4.3 Consulting PT Information to Compare Car with Public Transport

Finally, we asked respondents how often they consult PT information with the intention to compare car with public transport for unfamiliar or long distance (=over 50 miles) journeys. Respondents without a driving licence and without access to a car in their household were excluded from the analysis. Nearly half (43%) of the respondents said they never compared car with public transport (see Table 1). Indices of model fit show that the model performs well (RMSEA=0.004, CFI=1.000) (see Table 2).The results illustrate that respondents who never use PT information to compare travel modes (as opposed to those who at least sometimes do so) tend to have a negative public transport attitude, infrequently or never travel by train, tend to be lowly educated, and male. Furthermore, they have never received a recommendation to use a particular PT information service by others and are infrequent car users.

Public transport attitude consists of two statements (see Table 2), one of which measures the willingness to travel by public transport if parking was difficult or expensive. Our finding that people are more willing to compare travel modes when parking is difficult is in line with research that expected parking restraint to have a major influence on mode choice (*26*). Respondents on a high income use PT information less often to compare between car and public transport than those on lower incomes. Perhaps, reducing travel costs might be a reason for comparing travel modes.

The effects of car and train use in general on comparing travel modes are stronger than the other way round. This implies that there might be relatively little effect of PT information use on travel behaviour. To investigate this further, we asked respondents who indicated that they at least sometimes compare travel modes (N=549), how often they had decided to travel by public transport instead of by car after consulting PT information. The majority (78%) said they had done so sometimes, while 15% said they had done this often. Respondents were also asked how often they had decided to travel by car instead of by public transport after having consulted PT information. Half of the respondents said they had done this sometimes, while 48% said they had done this often. These figures suggest that it happens more often that people decide to travel by car after comparing travel modes than by public transport.

Respondents who already have decided to travel by public transport when they consult PT information are more likely to be people who, unsurprisingly, stated that they never compare travel modes and who have a positive public transport attitude. Despite having no statistically significant effect, we included the ease of consulting online PT information in the model, because leaving it out severely deteriorated the overall model fit. Any total effects of other factors via this variable on PT information use are also statistically insignificant (see

Table 2). Respondents who find it difficult to consult PT information online often do not have Internet access at home, are relatively older, and lowly educated. Moreover, respondents who are less aware of PT telephone and web information services also have more difficulties consulting PT information online. This seems to imply that the more PT information services one knows, the easier it is to consult PT information online. Increasing the awareness of PT information services might, therefore, be of some benefit in facilitating their use.

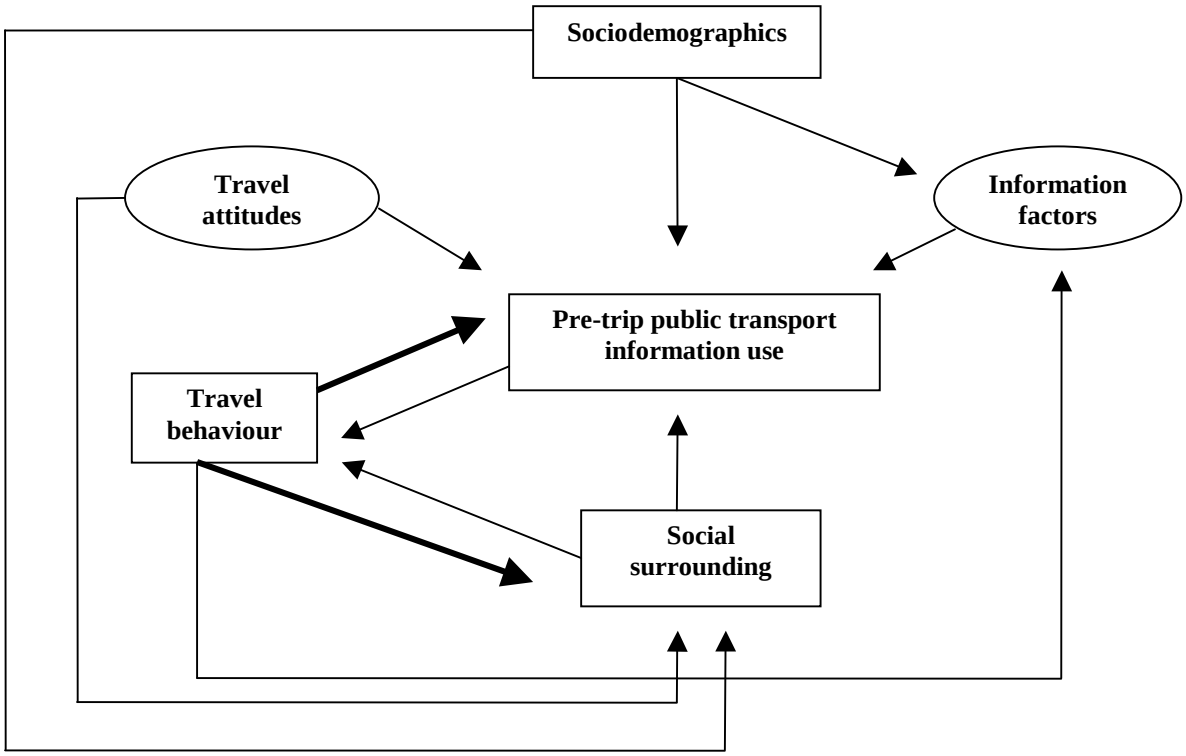
4.4 Summary

The differences between the various trip types studied are limited in terms of factors affecting PT information use. Regardless of trip type, the usual mode of transport when making various trip types, level of public transport use, and sociodemographics in general have the strongest impact on PT information use. This might mean that 'the person' is more important than the trip. Respondents seem to be less habitual in their mode choice when making unfamiliar trips. An interaction exists between public transport use and PT *information* use. However, the effect of public transport use on PT information use is stronger than the other way round, which is similar to some previous research (*11, 12*). As Figure 2 shows, we found all our hypotheses (see Section 2) confirmed. The observed relationships depicted in Figure 2 are, therefore, similar to our hypothetical model in Figure 1. An important exception is the direct effect we found (rather than the expected indirect one) of sociodemographics on PT information use. We were also unable to find a statistically significant effect of travel attitudes on information factors. Probably, travel behaviour is highly correlated with travel attitudes and, therefore, only one of the two factors had an effect on information factors.

- ***Car attitude***
- *Train attitude*
- ***Bus attitude***
- ***Willingness to travel by PT***
- ***Prefer car when travelling with friends***
- *Dislike way finding by car in unfamiliar area*

- ***Gender***
- ***Age***
- *Household type*
- *Presence of children*
- ***Education***
- *Full time employment*
- ***Income***
- ***City***
- *Car access*
- ***Internet use***
- ***Internet access***

- ***Awareness of PT info services***
- ***Ease of obtaining PT info via web***
- ***Ease of understanding PT info via web***
- ***Amount of trust in PT info via web***
- ***Dislike to look up train info***
- *Dislike to look up bus info*
- ***Already decided to use PT when consulting PT info***



- ***Car use***
- ***Train use***
- ***Coach use***
- ***Bus use***
- *Frequency of making a leisure/business/unfamiliar trip*
- ***Usual mode of transport when making a leisure/business/unfamiliar trip***

- ***Received a recommendation to use a PT info service by others***
- *Received a discouragement to use a PT info service by others*
- ***Most friends use PT regularly***
- ***Don't know many people who use PT regularly***

FIGURE 2 Results of Structural Equation Modelling (SEM) analyses (statistically significant variables are in bold)

5 CONCLUSIONS

Despite the investment in and growing availability of public transport (PT) information sources, levels of PT information use reported in the UK may be assumed to be failing to meet the expectations of some providers (*1*). This paper has sought to understand if, and how, travel behaviour, travel attitudes, information factors, social surrounding, and sociodemographics are associated with pre-trip PT information (non-)use. Long distance leisure and business trips within the UK, unfamiliar trips, as well as the use of PT information to compare car with public transport (and its consequences for mode choice) have been studied.

The results show that across various trip types, approximately the same factors are related to PT information (non-)use. Travel behaviour and sociodemographics have the strongest relationships with information use, suggesting that PT information use could be more about 'the person' (including their travel experience) than the specific trip. Respondents who usually travel by car when making leisure, business, and unfamiliar trips consult PT information less often for these trips than others. Additionally, infrequent public transport users consult PT information less often than frequent public transport users. Males consult PT information less often than females, as do lowly educated persons, people without Internet access at home, and persons with a positive car attitude.

The findings also suggest that the effect of public transport use on PT *information* use is stronger than the other way round. Moreover, only 43% of the respondents indicated that they at least sometimes consult PT information to compare car with public transport. Also, the results suggest that people decide relatively more often to travel by car after comparing travel modes than by public transport. It seems that the willingness to travel by public transport and public transport use affects PT information use more strongly than vice versa.

This could have important consequences for marketing efforts by information service providers: rather than directing attention to PT information itself, it might be a better strategy to try to improve public transport usage. Another issue that information service providers might want to address is the ease of obtaining and understanding information. The research shows that respondents who dislike looking up train information and who find it difficult to consult online travel information use PT information less often than others. Furthermore, awareness of PT information services seems to facilitate their use. Word of mouth seems to be important: respondents who were recommended to use certain PT information services by people they know say more often they consult PT information than others.

Further analysis showed that respondents who dislike consulting train information are people who: rarely use the train, do not know many people who use public transport, and find it difficult to consult online PT information. Unsurprisingly, respondents who have difficulty with consulting online PT information do not have Internet access at home. Also, they tend to be older respondents, lowly educated, and less aware of PT information services. Respondents who said they were recommended to use a certain PT information source are younger persons, frequent public transport users, and persons with a positive attitude towards travel by bus.

Contrary to our expectations, the effects of sociodemographics on PT information use are direct, rather than indirect via travel behaviour or travel attitudes. It might be that some important factors have been omitted from the analyses, that might explain these direct effects. Future research could address this.

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