Car use in ski resort: the moderating role of perceived lack of facilities

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Abstract

Fifty-seven percent of greenhouse gases produced by ski resorts are due to the transport of tourists to the resorts. More than eighty percent of them travel by car. Reduced car use to and around ski resorts is therefore a major objective for public policy. The Theory of Planned Behavior is used to identify the determinants of reduced car use during a tourist's stay in a ski resort. The moderating role of perceived lack of facilities also is tested. A field study ($n = 485$ tourists) shows that perceived behavioral control is the only significant determinant of reduced car use. Perceived lack of facilities moderates the influence of attitude and of subjective norms on this behavior.

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Introduction

Tourism's impacts on the global environment have long been identified (Dubois & Ceron, 2006; Lyppez-Sanchez & Pulido-Fernandez, 2014). But, "although transport is clearly a fundamental part of the tourism system, both as a facilitator of access to tourism destinations and as a fundamental part of the tourism experience itself, sustainable transport for tourism is not a well understood topic and is certainly under-researched" (Dallen, 2007: 180). Transport is by far the element of a tourism product that contributes the most to greenhouse gas emissions (Peeters &

Schouten, 2006; Verbeek & Mommaas, 2008). Although aviation is an increasing concern regarding these emissions, the car still dominates short-distance tourism travel (Dickinson, Lumsdon & Robbins, 2011). Peeters & Schouten (2006: 158) distinguish origin-destination transport and local transport. The present study focuses on the latter, less researched than the former as regards its negative impact on the environment (Dickinson & Dickinson, 2006). From this very point of view, there is certainly a need for a shift from cars to more sustainable forms of transport in

tourism destinations (Dickinson, Lumsdon & Robbins, 2011).

Transport research at large shows that “hard” and “soft” policies have been implemented to encourage that shift. This article is a contribution to the research stream that advocates “soft” transport policies, as opposed to “hard” policies, in order to reduce car use (e.g. Möser & Bamberg, 2008; Richter, Friman & Gärling, 2010, 2011; Bamberg, Fujii, Friman & Gärling, 2011; Friman, Larhult & Gärling, 2013). Hard transport policy measures involve for instance physical improvements of infrastructure whereas soft transport policy measures use techniques of information dissemination and persuasion in order to motivate individuals to voluntarily reduce car use or to switch to sustainable travel modes (e.g. workplace or school travel plans, car sharing schemes, marketing of public transport, travel awareness campaigns, etc.) (Bamberg et al., 2011). Research shows that in general soft transport policy measures are effective, though the heterogeneity of the results makes it difficult to infer why the measures are effective (Richter, Friman & Gärling, 2010, 2011).

To our knowledge, few studies have yet focused on soft transport in the context of tourism. This research is one of the first attempts at bridging this gap. It aims at exploring the effect of some psychosociological variables on reduced car use in ski resorts. Faced with international competition, many ski resort stakeholders have understood the importance of environmentally responsible management. Since the development of the French ‘National Charter for Sustainable Development’ in 2006, some ski resorts have conducted carbon footprint evaluations. Results show that fifty-seven percent of greenhouse gas emissions by ski resorts are due to the transportation of holidaymakers to the resort, around the resort during their stay, and back home (source: http://www.mountainriders.org/_EcoGuideStations/docs/Ecoguide_stations_2014.pdf). In response, some ski resorts have implemented free shuttle services (e.g. *Alpe d'Huez*, *Valloire*, *Combloux*, *Saint-Gervais*). However, they have noted that traffic has not decreased and therefore question the effectiveness of their approach.

The Theory of Planned Behavior (Ajzen, 1991) is probably the most widely used theoretical framework to identify the determinants of environmental behavior, including car use (e.g. Aarts, Verplanken & Van Knippenberg, 1998; Bamberg & Schmidt, 2003; Bamberg, Azjen & Schmidt, 2003; Knussen et al., 2004; Knussen & Yule, 2008; Bamberg et al., 2011). The first aim of this article is to show the relevance of this theoretical framework applied to automobile use in ski resorts.

A second aim of our research is to enrich the planned behavior perspective by adding a moderator in the model. In the field of recycling, some studies have shown that a perceived lack of facilities moderates the relationships between the explanatory variables in the model of planned behavior and behavioral intentions and/or the behavior studied (Knussen et al., 2004, Chen & Tung, 2010). In our study, we hypothesize that the non-use of a car in a ski resort is facilitated by the presence of facilities (typically a public transport system). Consequently, we test the moderating role of this variable. According to Verbeek and Mommaas (2008: 632), “the current literature on sustainable tourism mobility represents a rather neat actor-structure dualism”. Being, basically, a test of the Theory of Planned Behavior model, our research is mainly focused on actors. But using perceived lack of facilities makes it at least indirectly “structure-centered” as sustainable transport facilities (e.g. electric shuttles in *Alpe d'Huez*), when they exist, are part of the technological structure of a resort. We thus modestly contribute to reduce the aforementioned “dualism”.

The theoretical framework is presented in the first part of the paper. It leads to the development of a theoretical model, subject to an empirical test, the details of which are given in the second part. The results of the analysis are presented in the third part, followed by a discussion of these results in the fourth. In the fifth and final part, the limitations of the research and suggestions for future research are presented.

Conceptual framework and model tested

The Theory of Planned Behavior

The Theory of Planned Behavior model (Ajzen, 1991) assumes that the intention to adopt a behavior is based on conscious reasoning, and this behavior is at least partly under the volitional control of the individual. According to this model, intention is the most direct antecedent of behavior (Ajzen & Fishbein, 2005). It is itself predicted by factors related to attitude, social norms and perceived behavioral control. Attitude reflects the assessment and the consequences of the behavior. Social norms reflect the sensitivity of an individual to others who want him or her to perform the behavior. Perceived behavioral control has two components: internal and external. The first represents an individual's sense of self-efficacy, the second, a collection of external/situational conditions that facilitate or hinder the adoption of the behavior considered.

The explanatory power of the Theory of Planned Behavior model has been empirically demonstrated on a large spectrum of intentions and behaviors (e.g. Armitage & Conner, 2001), including in the field of environmental practices (e.g. Terry, Hogg & White 1999; Bamberg, Ajzen & Schmidt, 2003). It also has been recognized that the explanatory power of the three variables mentioned above is largely dependent on the empirical context in which the model is tested (Ajzen & Fishbein, 2005: 197). For example, in the area of recycling, it seems that subjective norms contribute less than attitude and perceived behavioral control (e.g. Terry, Hogg & White, 1999; Armitage & Conner, 2001; Knussen et al., 2004). In the field of transport, the Bamberg and Schmidt study (2003: 277) shows that the three variables contribute substantially to the intention of car use, while Wall, Devine-Wright and Mill (2007) highlight an influence of perceived behavioral control that is higher than that of attitude and subjective norms. This inconsistency pleads for more empirical evidence in this stream of research and the influence of these three variables on car use in ski resorts will therefore be explored in this study.

Perceived lack of facilities

In the field of recycling, studies show that pro-environmental behavior is largely determined by access to a structured and institutionalized

program, which facilitates the adoption of this behavior (Derksen & Gartrell, 1993) and includes equipment (outdoor trash, garbage cans). Conversely, a lack of practical facilities is a major obstacle to the practice of recycling, even for individuals who have clearly expressed the desire to do so (McCarty & Shrum, 1994). Other studies highlight the moderating role of perceived lack of facilities on the relationship between some of the variables in the model of planned behavior. Knussen et al. (2004) show that this moderating role is limited to perceived behavioral control, whereas Chen and Tung (2010) also show an interaction between perceived lack of facilities and social norms. The convenience of car use suggests that for drivers willing to adopt an alternative transport mode, they must perceive the existence of credible alternatives in terms of value (e.g. faster, cheaper, safer). This suggests that a perceived lack of alternative facilities will be a strong moderator of the relationships between the exogenous and the endogenous variables of the planned behavior model.

As a consequence, we test the moderating role the variable plays in the relationship between the three determinants of planned behavior (attitude, social norms and perceived behavioral control) and frequency of car use. Figure 1 presents the theoretical model tested in this research.

Method

This research is part of a wider project involving several institutional partners. The Mayor's Offices of *Combloux* and *Saint Gervais* were two of these partners. *Combloux* and *Saint Gervais* are two village ski resorts ("*stations villages*" in French) in the Mont Blanc massif. Both are strongly committed to sustainable development and accepted to collaborate on our project (<http://www.saintgervais.com/>; <http://www.mairie-combloux.fr>).

Sampling and data collection

The reference population consisted of tourists who had stayed either in *Combloux* or *Saint Gervais* during the winter of 2010-2011. The data were collected online in May 2011. The questionnaire was developed with the *Sphinx*

Figure 1. The theoretical model

Table 1. Description of the samples

Variable	Values	Relative frequencies Saint-Gervais	Relative frequencies Combloux
Gender	Male	56.9%	47.2%
	Female	43.1%	52.8%
Age	15-39	25.9%	25.0%
	40-54	53.8%	38.9%
	55-64	13.2%	28.1%
	65 and older	7.1%	8.0%
Occupation	PCS+ ¹	65%	45.5%
	PCS-	22.3%	31.6%
	Retired	12.7%	22.9%
Income	< 4200	54.9%	71.4%
	More than 4200 ²	45.1%	28.6%

Notes: ¹ *Profession et Catégorie Socioprofessionnelle* (PCS) is the French term for occupation. PCS+ gathers people with a high occupational status (e.g. executives, professionals...) whereas PCS- gathers people with a low occupational status (e.g. employees, workers...). This is an *ad hoc* coding, as the INSEE (*Institut National de la Statistique et des Etudes Economiques*) official classification is made of nine categories.

² Only 20% of the French population has a net monthly income superior or equal to 4200 euros. Source: <http://www.salairemoyen.com/france.html#Uvnj4q4xi9c>, retrieved on February 11, 2014

Online software (<http://www.sphinxsurvey.com/>) and hosted on one of the company's servers. An e-mail was sent to 3000 addresses provided by both resorts. It introduced the general context of the study and included a link to the server. A total of 485 questionnaires with no missing data were returned, yielding a 14.4% return rate. The fact that the respondent had actually stayed either in *Combloux* or *Saint Gervais* during the winter of 2010-2011 also was verified. Respondents were split into two

subsamples, one for *Combloux* ($n = 288$) and one for *Saint-Gervais* ($n = 197$). Some descriptive data on both samples are given in Table 1.

No conclusive remarks can be drawn from these data as the actual composition of both reference populations (i.e. the tourists visiting *Combloux* and *Saint Gervais*) is unknown. It may nevertheless be observed that the *Combloux* sample is almost balanced in terms

of gender repartition whereas the proportion of males in the *Saint Gervais* sample is higher. The difference is significant ($\chi^2 = 3.965$, $df = 1$, $p = 0.046$). Most people are aged between 40 and 64 in both samples which nevertheless significantly differ on this variable ($\chi^2 = 17.762$, $df = 3$, $p = 0.000$). *Combloux*'s clientele is older than *Saint Gervais*'. Both resorts also significantly differ in terms of occupational status ($\chi^2 = 18.445$, $df = 2$, $p = 0.000$). In *Saint Gervais*, almost two thirds of the respondents have a high occupational status (PCS+ in table 1), whereas they are less than 50% in *Combloux*. These percentages suggest that *Saint Gervais* is, from this point of view, at a higher end of the market than *Combloux*. This is corroborated by the income data: 45.1% of the *Saint Gervais* respondents have a net monthly income above 4200 euros. Only 28.6% of people in the *Combloux* sample are in this category. Again, both samples significantly differ on this variable ($\chi^2 = 12.146$, $df = 1$, $p = 0.000$).

Measures

The behavior (i.e. not using a / one's car in a ski resort) was measured through a single item assessing the frequency of the behavior ("Once in the resort, how frequently did you use a / your car?"). Five ordered categories were suggested, ranging from "Every day" to "Never".

Attitude toward the behavior, social norms and perceived behavioral control are derived from Ajzen's (1991) Theory of Planned Behavior model. Attitude was measured with seven items adapted from the Theory of Planned Behavior literature. Four were borrowed from Tonglet, Phillips and Read's (2004: 202) research on recycling. The scale was completed with one item borrowed from Knussen et al. (2004: 240) (pleasant/unpleasant) and two *ad hoc* items (pleasant/unpleasant, good/evil). The "good/bad" item was split in two new items as "Good" translates into « bien » or « bon » in French. Both convey a different notion of the good, as reflected in their opposites [respectively "mal" (evil) and "mauvais" (bad)]. The items were measured with five-point semantic differentials. The coding went from 1 for a strong negative perception (e.g. very bad)

to 5 for a strong positive perception (e.g. very good).

The social norms items were borrowed from Tonglet et al. (2004: 202) and Knussen et al. (2004: 240). Perceived behavioral control was measured with three items adapted from the various examples given by Ajzen (2002a: 671). Perceived lack of facilities was measured with three items loosely inspired from Chen and Tung (2010: 841) and Knussen et al. (2004: 241). They were adapted to the specific perception of a lack of facilities, which would offer an alternative to the use of a car in a ski resort. The external facet of perceived behavioral control is conceptually close to perceived lack of facilities. They both pertain to beliefs in external/situational conditions that facilitate or hinder the adoption of the behavior considered. To avoid lack of discriminant validity, we only measured the internal facet of perceived behavioral control. The writing of the items of both concepts nevertheless shows some redundancy, which suggests that both measures should be improved. As we wanted to stay close to extant literature, for sake of result comparison, this will be considered for further research.

The items were translated into French by the authors and back translated into English by a French acculturated North-American colleague with skills in intercultural management. The few differences in the two English versions were discussed in order to come up with a final French version, which was eventually included in the questionnaire. Five-point Likert scales ranging from "Totally disagree" (1) to "Totally agree" (5) were used to measure social norms, perceived behavioral control and perceived lack of facilities. All of the items are presented in Appendix 1.

Results

Table 2 shows that the samples differ on various behavioral variables at the usual 5% risk level, with the exception of the transportation mode.

Nevertheless, people in both resorts show similar characteristics. They are mainly regular customers, staying with children. More than 90% of them come by car, 80% of whom

Table 2: *Respondents' behavior once in the resort*

Variable	Categories	Saint-Gervais	Combloux	Test statistic
Transportation mode (to come to the resort)	Car	95.8%%	93.8%	$\chi^2 = 0.043$ df = 1 p = 0.836
	Other	4.2%	6.2%	
Frequency of use	Every day or almost every day	50.3%	61.1%	$\chi^2 = 12.428$ df = 2 p = 0.002
	Once or twice	27.9%	15.0%	
	Never	21.8%	24%	
Modalities of stay	Couple with children	63.5%	53.8%	$\chi^2 = 6.056$ df = 2 p = 0.048
	Couple without children	16.2%	24.8%	
	Other	20.3%	21.3%	
Regular customer	Yes	77.8%	68.4%	$\chi^2 = 4.679$ df = 1 p = 0.031
	No	22.2%	31.6%	
Length of stay	Average number of days	12.54	7.70	t = 5.191 df = 202; 163 p = 0.000
	Standard deviation	12.78	2.52	

Table 3. *Correlations between attitude toward the behavior, social norms, perceived behavioral control, perceived lack of facilities and frequency of car use*

	Attitude toward the behavior	Social norms	Perceived behavioral control	Perceived lack of facilities	Frequency of car use	ρ_{vc}
Attitude	1	0.225	0.082	0.036	0.051	0.651
Social norms	0.474	1	0.156	0.060	0.079	0.724
Perceived behavioral control	0.287	0.395	1	0.474	0.355	0.694
Perceived lack of facilities	-0.190	-0.244	-0.689	1	0.219	0.654
Frequency of car use	0.225	0.281	0.596	-0.468	1	

continue to use their cars at least once when they are in the resort.

To test the model, the two samples were pooled. We deemed this feasible as *t*-tests for differences in means showed non-significant differences for all items but two. We assumed this to be negligible (Appendix 2).

As the factorial structures of the scales are well known, the exploratory stage was skipped and four maximum-likelihood confirmatory factor analyses were conducted, with EQS 6.1. (Bentler, 2006). Their results (loadings, reliability and validity) are given in Appendix 3. Fit statistics for social norms, perceived behavioral control and perceived lack of facilities are not reported as three-item congeneric factor-analytic models have zero degree of freedom and consequently perfectly fit the data (Kline, 2011, p. 126, 138). The

seven attitude items were hypothesized to be one-dimensional. Three CFAs were necessary to come up with an acceptable five item structure, used in subsequent analyses [χ^2_{SB} (ddl) = 6.52 (5); $p = 0.259$; $CFI_{SB} = 0.998$; $RMSEA_{SB}$ (90% CI) = 0.025 (0.000; 0.072); $SRMR = 0.014$; $\Gamma_1 = 0.999$; $\Gamma_2 = 0.996$]. Robust fit statistics, when available, were used. These statistics are corrected for the effects of deviations from a multivariate normal distribution of the indicator variables (Satorra & Bentler, 1994; Chou, Bentler & Satorra, 1991). The $SRMR$ and Γ values are not corrected (Bentler, 2006).

The fourteen remaining items and the measure of the frequency of car use in the resort were gathered into a measurement model, which fit the data satisfactorily [χ^2_{SB} (df) = 102.856 (81); $p = 0.051$; $CFI_{SB} = 0.987$; $RMSEA_{SB}$ (90% CI) = 0.024 (0.000; 0.037); $SRMR = 0.051$; $\Gamma_1 =$

0.994; $\Gamma_2 = 0.991$]. As the behavior is measured on an ordinal scale, the entry data for such a model is a polyserial correlations matrix. The latent factor correlations are all significant at $p < 0.05$ (Table 3). Perceived lack of facilities is negatively correlated to attitude toward the behavior, social norms, and perceived behavioral control, and also to the frequency of car use. This is consistent with what was expected and justifies testing its moderating role.

A first test of the structural model of Figure 1, without perceived lack of facilities to begin with, yielded satisfactory results [χ^2_{SB} (df) = 129.846 (49); $p = 0.000$; $CFI_{SB} = 0.956$; $RMSEA_{SB}$ (90% CI) = 0.059 (0.046; 0.071); $SRMR = 0.050$; $\Gamma_1 = 0.973$; $\Gamma_2 = 0.957$]. It appears that the structural relations between attitude and frequency of car use and between social norms and frequency of car use are not significant [$\gamma_{att-fcu} = 0.059$ ($p = 0.127$); $\gamma_{sn-fcu} = 0.013$ ($p = 0.404$)]. In this research, perceived behavioral control is the only variable of the Theory of Planned Behavior model (Ajzen, 1991) to significantly influence the frequency of car use in the resort [$\gamma_{pbc-fcu} = 0.609$ ($p = 0.000$)]. If perceived lack of facilities is introduced in the model, its direct relation with the frequency of car use is not significant [$\gamma_{plf-fcu} = -0.113$ ($p = 0.169$)] and the other structural relations are not markedly changed [$\gamma_{att-fcu} = 0.057$; $\gamma_{sn-fcu} = 0.022$ and $\gamma_{pbc-fcu} = 0.528$].

The moderating role of perceived lack of facilities was tested by means of a multigroup analysis, the results of which are given in table 4. Byrne (2006: 228-244) describes the procedure in full detail. The factor score of perceived lack of facilities was first computed through a Principal Component Analysis. A median-split on this factor score then created two groups of approximately equal size. The first is composed of people with low scores on perceived lack of facilities, namely those who

do not perceive a lack of an alternative to car use in the resort. The second group gathers people who perceive more acutely a lack of such facilities in the resort. Prior to the multigroup analysis, the existence of a relationship between perceived lack of facilities and the frequency of car use in the resort was tested. As the latter variable was measured with an ordinal scale, the Mann-Whitney U test was performed *in lieu* of a t -test. The result is significant ($U = 17475.5$; $z = -8.001$; $p = 0.000$). As expected, people in group 1 use their car significantly less than people in group 2.

The model (Figure 1 without perceived lack of facilities) was then tested in each group. In both cases, the third item of perceived behavioral control showed a weak loading and generated strong residuals with many other items. This item was discarded. The fit of the configural invariance model was satisfactory ($SRMR = 0.049$ and $RMSEA = 0.038$). The measurement invariance and structural invariance models did not yield a significantly worse fit. This means that loadings and factor covariance may be estimated to be equal in both populations. A final model, in which structural coefficients were constrained to equality across groups, showed a significantly worse fit [$\Delta\chi^2_{SB} = 9.276$; $\Delta df = 3$; $p = 0.026$]. The p -values related to the chi-square difference tests were computed on <http://www.xuru.org/st/PD.asp>.

The multivariate Lagrange tests showed that the differences between structural coefficients were significant for all structural relationships except for that between perceived behavioral control and behavior. It may be inferred that the influence of attitude and of social norms on the frequency of car use varies in both groups, which means that perceived lack of facilities actually moderates these relationships. When a maximum-likelihood estimation is used, the difference between the χ^2 of two

Table 4. Results of the multigroup analyses

Model	χ^2_{SB}	df	CFI_{SB}		$\Delta\chi^2_{SB}$	Δdf	p	$ \Delta CFI_{SB} $
CI	131.877	78	0.967					
MI	139.503	88	0.968	MI – CI	4.700	10	0.910	0.001
SI _{cov}	145.394	91	0.966	SI _{cov} – MI	5.565	3	0.135	0.002
SI _{sc}	153.595	94	0.963	SI _{sc} – SI _{cov}	9.276	3	0.026	0.003

nested models, generally referred to as $\Delta\chi^2$, follows a χ^2 distribution with a degree of freedom equal to the difference in degrees of freedom of both models. This assertion does not stand, though, when Satorra-Bentler robust corrections are used (Byrne, 2006: 218). Satorra and Bentler (2001) have proposed a correction of this test, which was used in this research.

Discussion and contributions

Using a theoretical framework inspired from the Theory of Planned Behavior–(Ajzen, 1991), this research tested the moderating role of perceived lack of facilities on the relationships between attitude, social norms and perceived behavioral control and a behavior consisting of not using a car. The empirical context was that of ski resorts, where the traffic generated by tourists in winter is responsible for over half of greenhouse gas emissions.

Results mainly show that almost all tourists travel by car, even though the two resorts considered here are easily accessible by train, particularly from Paris. Once at the resort, they continue to use their cars, even though both resorts propose a free shuttle service.

Perceived behavioral control is the only Theory of Planned Behavior—variable to influence behavior. Attitude and social norms have no effect in this research. In other words, a positive attitude towards not using one's car in the resort is not linked to actual behavior. In the same way, being sensitive to group pressure on this matter provides no information whatsoever on people's actual behavior. In contrast, perceived behavioral control plays a role. In some way, this is consistent with the results of Bamberg, Hunecke and Blöbaum (2007, p. 200), who show that these three variables have very different effects on

Figure 2. Main results of the research

Table 5. Differences in means between independent variables

	Perceived lack of facilities	Mean	F	p	Size effect	Power
Social norms	1.00	0.1903	17.627	0.000	0.187	0.987
	2.00	- 0.1856				
Perceived behavioral control	1.00	0.5453	203.93	0.000	0.546	1.000
	2.00	- 0.5454				
Attitude	1.00	0.1233	7.369	0.007	0.122	0.773
	2.00	- 0.1227				

intention and behavior depending on the city where the data were collected. This suggests an important effect of the local context of transport organization. Indeed, there is a wide array of situations regarding car use in French ski resorts. Some are "car free" (e.g. *Avoriaz*, *Valmorel*, *Val Thorens*). Some are geographically concentrated on a very small area and using a car is not really an issue (e.g. *Les 7 laux*, *Auris en Oisans*). On the contrary, some are made of several quarters or hamlets which may be at some distance from each other (e.g. *Alpe d'Huez*, *Valloire*, *Les 2 Alpes*, *Les Menuires*). In these resorts, car use is often the only convenient way to go from one place to another. That is why some resorts (including the two considered in this study) now offer a shuttle service, generally unconditionally free of charge. Our results obviously apply to those resorts where car use is really an issue, namely in the latter category, and have to be interpreted accordingly.

The main results of the moderation analyses are presented in Figure 2. Structural coefficients pertaining to group 1 are above the arrows; those pertaining to group 2 are below the arrows.

First, perceived lack of facilities is related to not using one's car. People who do not perceive acutely a lack of facilities (group 1) tend to use their cars less often. The converse is true for those who do perceive acutely a lack of facilities. Second, the average scores of attitude, social norms and perceived behavioral control significantly differ across groups (Table 5).

The differences are as expected. Not using one's car while in the resort is more negatively assessed by those who perceive a lack of facilities (group 2). Conversely, it is more positively assessed in group 1. Moreover, Figure 2 shows that attitude positively influences behavior in group 1 whereas the relationship is not significant in group 2.

The social pressure associated with not using a car is felt more strongly in group 1. Even if the influence of social norms on behavior is nonsignificant in both groups, it may be noted that the sign of the effect is positive in group 1

and negative in group 2. In other words, and depending on further validation, people who are less sensitive to group pressure regarding car use in a ski resort tend to actually use their car more often. Finally, the degree of personal control over the behavior is more strongly felt in group 1 than in group 2. The latter, who perceive more acutely a lack of facilities (which would allow them not to use their car), also consider this behavior less easy to adopt and less under their control. In contrast, the difference in the perception of the lack of facilities between the two groups does not influence the strong positive relationship between perceived behavioral control and actual behavior.

It is not easy to compare these results to those reported in existing literature for many reasons. Either the empirical context was different (e.g. recycling has attracted a lot of attention), the actual behavior was not measured (e.g. Bamberg & Schmidt, 2003), the influence of attitude, social norms and perceived behavioral control on actual behavior was mediated by behavioral intention (e.g. Bamberg, Hunecke & Blöbaum, 2007), perceived lack of facilities was not considered, or differences in the methods used render the results difficult to compare.

With regard to the effect of perceived lack of facilities, to our knowledge only two field studies are similar to what is reported here. Chen and Tung (2010) and Knussen et al. (2004) do not elicit a direct link between perceived lack of facilities and intention to recycle. However, they do show an interaction effect between perceived lack of facilities and perceived behavioral control. The latter has a stronger influence on intention to recycle when perceived lack of facilities is low (Knussen et al., 2004, p. 243). This is not in line with the present research, where no interaction effect between these two variables is shown.

When indirect effects between attitude, social norms, perceived behavioral control and perceived lack of facilities are taken into account, the direct effect of these factors on actual behavior becomes nonsignificant. However, the values of the structural coefficients do not change markedly, with the exception of perceived behavioral control. The

association between this variable and perceived lack of facilities probably plays an important role in the disappearance of the relationship between this perception and the behavior. A regression model does not take indirect effects into account, which probably makes the present result more reliable. However, in Chen and Tung (2010: 386), the sign of the relationship is negative, as it is here. A perceived lack of facilities is associated with a weaker intention or a less frequent behavior.

The main theoretical contribution of this research is to demonstrate a strong effect of perceived behavioral control on the frequency of car use. The more an individual feels free to determine his or her car use, the less the car is used. This effect is not moderated by perceived lack of facilities, in contrast with the attitude and social norms associated with the behavior. In other words, the perception of strong internal control seems to weigh more in the adoption of the behavior than the perception of strong external control, which is generally negatively felt. These results are not in line with those obtained in the context of recycling (Knussen et al., 2004; Chen & Tung, 2010). This is consistent with the findings of Ajzen & Fishbein (2005, p. 197) who suggest that the Theory of Planned Behavior model is highly sensitive to the empirical context in which it is tested.

From a methodological viewpoint, using structural equation modeling rather than regression analysis probably allowed us to tackle the problem more accurately because covariance structure analysis allows an analysis of direct and indirect effects. Attitudes, social norms and control perceptions, though conceptually different, may be intercorrelated because they are partially built on the same information. For example, people who think they lack the necessary skills to adopt a given behavior will probably anticipate failure and, consequently, might develop a negative attitude toward the behavior (Ajzen & Fishbein, 2005: 195).

From a managerial point of view, communication is clearly important. Although both of the ski resorts studied offer a free shuttle service to reduce car use, tourists are accustomed to using their cars on a daily basis

and continue to do so during their stay in the resorts. The results show a wide discrepancy between respondents on perceived lack of facilities. Those who score high on this variable use their car more often. Three possible explanations may be noted. First, they are not aware of the existence of the shuttle system. Second, they do not use the shuttle service because they find it inconvenient, noisy, dangerous, etc. Third, the existence of the shuttle service is not salient because their car use habit is too strong. It would be interesting to pursue the research and develop a typology of possible obstacles to the use of alternative transport systems in ski resorts.

Based on the Swedish case, Friman et al. (2013) show that to reduce car use on a long-term basis integrated programs are more efficient than communication alone. The most efficient programs are built around personalized communication, incentives and feedback. If ski resorts are to achieve a significant reduction in the traffic generated by tourists, they would need to tailor separate responses (i.e. programs) to each of the three abovementioned possible factors determining continued car use. First, they should communicate intensively on the existence of a free shuttle service (or any other alternative to the car) in the resort and offer incentives to those who would commit themselves to using it. Second, they should identify sources of discontent and improve the shuttle service appropriately. To achieve this goal, they would have to federate all stakeholders of the destination (Tomsett and Shaw, 2015). Third, they should identify peoples' sources of resistance to habit change. In all three cases, decisions would be difficult to make because competition between resorts is harsh and the fear of losing customers would probably be a strong obstacle for decision makers.

Perceived lack of facilities is less acute when people feel they have control over their behavior. Efforts to change attitudes (e.g. "not using one's car in the resort is good for...") or to reduce perceived social pressure (e.g. "what would people think of you if they saw you using your car in the resort?") would probably be ineffective as neither variable influences car use. Instead, resorts could use an argument

such as “You decide” and/or “Let’s do it together” in a spirit of partnership and of co-construction of the consumption experience (Sherry, 1998; Peñaloza, 1999).

Limitations, future research and conclusion

The main limitation of this study is the absence of behavioral intention in the model used. As Ajzen and Fishbein (2005, p. 188) note, behavioral intention is considered in extant literature as “the closest cognitive antecedent of actual behavioral performance”. However, our respondents completed the questionnaire after they had returned home, which would have made it difficult to answer questions pertaining to their intention to use or not their car once in the resort. The same questionnaire with intention instead of behavior as the focus could be administered shortly before winter, and then again after winter with intention replaced by actual behavior. This would allow the entire Theory of Planned Behavior model to be tested, but would make data collection far more complicated. In this study, time constraints rendered it impossible to start data collection before winter.

The temporal sequence of data collection itself is a second limitation. The Theory of Planned Behavior model is designed to predict a behavior which in fact was a past behavior for our respondents who may have been tempted to justify the use of their cars by a lack of transport facilities. A halo effect may therefore have influenced the answers. Moreover, the question pertaining to the behavior appeared before the attitudinal items in the questionnaire, which may have reinforced the halo effect.

Choosing multigroup analysis as a test of moderation is a third limitation. When continuous moderators are available, it is generally advised to model multiplicative interaction effects (e.g. Ping, 1995). This strategy is also criticized, mainly because of its complexity (Scott-Lennox & Lennox, 1995) and because it is grounded on stringent distributional assumptions that are rarely met in practice (Sauer & Dick, 1993). But it has three main advantages over multigroup analyses. First, discretizing the moderator may lead to an important loss of information. Second, no formal statistical test of the existence of an

interaction between the moderator and the independent variable(s) is available in a multigroup analysis. Finally, when a multigroup analysis is used, it is not possible to distinguish between “pure” moderators and “quasi” moderators (Sharma, Durand & Gur-Arie, 1981).

As emphasized by Ajzen and Fishbein (2005: 201-205), the Theory of Planned Behavior model itself suffers from some limitations. There have been active attempts to overcome these limitations over the last few years. In the field of responsible consumption, recent research has aimed to improve the explanatory power of the model by adding independent variables. Bamberg & Schmidt (2003), for example, have used variables borrowed from Schwartz’s (1977) Norm Activation Model (NAM) and Triandis’ (1977) Interpersonal Behavior Model. The results are encouraging, but most of this research focuses on intention and not on actual behavior. Moreover, the Theory of Planned Behavior model does not take past behavior into account. Setting aside the question of whether past behavior is an effective means to measure the strength of a habit, there is little doubt as to the influence of past behavior on current and future behavior (e.g. Aarts, Verplanken & Van Knippenberg, 1998; Ajzen, 2002b; Wood & Neal, 2009). When it comes to travelling to ski resorts, car based travel is deeply rooted in the system of provision of ski holidays. A 2003 SEATM (*Service d’Etudes et d’Aménagement de la Montagne*) study shows that more than 80% of the nights spent in ski resorts are spent by people who travelled by car. Train accounts for about 15% and other modes of transport (coach, plane) are marginal (source: http://www.virtualburo.fr/telechargements/Enquetes/chiffres_cles2004.pdf). Such a deeply rooted habit is not easy to change.

Finally, the Theory of Planned Behavior model assumes that a consumer acts in a “reasoned” way. This perspective is grounded in a cognitive framework which leaves no room for emotions or an enriched conception of intention focusing on long-term goals rather than on proximate behaviors (e.g. Conner & Armitage, 1998; Perugini & Conner, 2000).

More generally, new ways of assessing tourists' decision-making processes as regards the choice of a sustainable transport mode could be considered. First, drawing on a growing body of literature, Dickinson and Dickinson (2006: 196) argue that social representation theory (e.g. Rateau, Moliner, Guimelli & Abric, 2012) may help overcome the main limitations of traditional attitude theory which "fails to take account of the variability of human thought and action". The social representation approach is "well suited to be applied to views on transport which involve social dilemmas and contradictory perspectives and which regularly surface in government and media discourses" (Dickinson & Dickinson, 2006: 199). They suggest that dominant representations such as "people would use more public transport if it were improved" could actually mask much more variable and contradictory views.

Second, research could draw on a now well-established tradition of more reflexive studies which address the cultural construction of reality, generally referred to as "Consumer Culture Theory" (e.g. Arnould & Thompson, 2005). Consumer Culture Theory refers to a family of theoretical perspectives that address the dynamic relationships between consumer actions, the marketplace, and cultural meanings. In this perspective, consumer culture is defined as "a social arrangement" consisting of an "interconnected system of commercially produced images, texts, and objects", obtained "through the construction of overlapping and even conflicting practices", that people use to make sense of their environment (Arnould & Thompson, 2005: 869). There seems to be little doubt that the decision to drive, or not, a car during a vacation in a ski resort involves that kind of "social arrangement" grounded in conflicting representations and practices. To uncover and understand these representations and practices, research based on "ethnomarketing" could probably be helpful. "Ethnomarketing" relies on ethnographic observation and anthropological analysis applied to the study of consumer behavior and aims at making propositions that "can translate into a real marketing apparatus (positioning, targeting,

marketing strategy, marketing mix, etc.) (Badot, Carrier, Cova, Desjeux & Filser, 2009: 95).

Grounded in the general conceptual framework of responsible consumption, this research is one of the first attempts to assess the effect of psychological variables on actual car use in ski resorts. It mainly demonstrates that high perceived behavioral control leads to reduced car use, regardless of the perceived existence of facilities that would allow an individual to avoid using his or her car. Conversely, an acute perceived lack of facilities leads to a less favorable attitude toward reduced car use. As tourist-generated traffic is the main source of greenhouse gas emissions in ski resorts, tackling this problem is extremely important.

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Appendix 1. Measurement scales

Variables	Items
Attitude	<p>"Not using one's car in a ski resort is"</p> <p>1. Very bad; 2. Rather bad; 3. Nor bad, nor good; 4. Rather good; 5. Very good</p> <p>1. Very unuseful; 2. Rather unuseful; 3. Neither useful nor unuseful; 4. Rather useful; 5. Very useful</p> <p>1. Very irresponsible; 2. Rather irresponsible; 3. Neither responsible nor responsible; 4. Rather responsible; 5. Very responsible</p> <p>1. Very harmful; 2. Rather harmful; 3. Neither beneficial nor harmful; 4. Rather beneficial; 5. Very beneficial</p> <p>1. Very unpleasant; 2. Rather unpleasant; 3. Neither pleasant nor unpleasant; 4. Rather pleasant; 5. Very pleasant</p> <p>1. Very evil; 2. Rather evil; 3. Neither good nor evil; 4. Rather good; 5. Very good</p> <p>1. Not smart at all; 2. Rather not smart; 3. Neither not smart nor smart; 4. Rather smart; 5. Very smart</p>
Social norms	<p>"Most people who are important to me:"</p> <p>✓ Think I should not use a car in a ski resort</p> <p>✓ Would approve of me not using a car in a ski resort</p> <p>✓ Think that not using a car in a ski resort is a good thing to do</p>
Perceived behavioral control	<p>✓ To me, not using a car in a ski resort is easy</p> <p>✓ I can easily do without using a car in a ski resort</p> <p>✓ Not using a car in a ski resort is a decision that is entirely up to me</p>
Perceived lack of facilities	<p>✓ In a ski resort, one has to drive his car because there is no other solution</p> <p>✓ In a ski resort, the public transport organization makes it inevitable to use one's car</p> <p>✓ Car is the only means of transport worth considering</p>

Appendix 2. Comparison of both samples on the measurement variables of the model

Variable	Item	Mean Saint-Gervais	Mean Combloux	t	p
Attitude	Good (bad)	4.10	4.09	0.081	0.936
	Useful	3.75	3.78	-0.394	0.694
	Responsible	3.94	3.91	0.404	0.686
	Smart	3.67	3.74	-0.902	0.368
	Beneficial	3.99	4.02	-0.407	0.684
	Pleasant	3.70	3.77	-0.715	0.475
	Good (evil)	3.96	4.04	-0.932	0.352
Social norms	Should not	3.16	3.41	-2.227	0.026
	Approve	3.55	3.72	-1.585	0.114
	Good thing	3.76	3.92	-1.547	0.123
Perceived behavioral control	Easy	2.90	3.08	-1.392	0.165
	Do without	2.90	3.09	-1.428	0.154
	Up to me	2.87	3.05	-1.317	0.188
Perceived lack of facilities	No other solution	3.01	2.66	2.710	0.007
	Inevitable	2.81	2.64	1.347	0.179
	Worth considering	2.25	2.06	1.834	0.067

Appendix 3. Scale loadings, reliabilities and average variances extracted

Variable	Item	Loading	α	ρ	ρ_{vc}
Attitude	Good (bad)	0.768	0.902	0.903	0.651
	Useful	Discarded			
	Responsible	0.815			
	Smart	0.735			
	Beneficial	0.852			
	Pleasant	Discarded			
Social norms	Good (evil)	0.858	0.880	0.883	0.724
	Should not	0.770			
	Approve	0.973			
	Good thing	0.796			
Perceived behavioral control	Easy	0.910	0.846	0.868	0.694
	Do without	0.966			
	<i>Up to me (discarded in subsequent analyses)</i>	<i>0.564</i>			
Perceived lack of facilities	No other solution	0.818	0.844	0.855	0.654
	Inevitable	0.898			
	Worth considering	0.699			