university of groningen

University Medical Center Groningen

University of Groningen

Sustainable transportation in Argentina

Jakovcevic, Adriana; Steg, Linda

Published in:
Transportation Research. Part F: Traffic Psychology and Behaviour

DOI:
10.1016/j.trf.2013.05.005

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2013

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):
Jakovcevic, A., & Steg, L. (2013). Sustainable transportation in Argentina: Values, beliefs, norms and car use reduction. *Transportation Research. Part F: Traffic Psychology and Behaviour*, *20*, 70-79. https://doi.org/10.1016/j.trf.2013.05.005

Copyright
Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the “Taverne” license. More information can be found on the University of Groningen website: https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment.

Take-down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): http://www.rug.nl/research/portal. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Download date: 04-06-2022

Transportation Research Part F 20 (2013) 70–79

Contents lists available at SciVerse ScienceDirect

Transportation Research Part F

journal homepage: www.elsevier.com/locate/trf

Sustainable transportation in Argentina: Values, beliefs, norms and car use reduction

Adriana Jakovcevic [a,*], Linda Steg [b,1]

[a] Instituto de Investigación en Luz, Ambiente y Visión, CONICET-UNT, AV. Independencia 1800, CP 4000 San Miguel de Tucumán, Tucumán, Argentina
[b] Faculty of Behavioural and Social Sciences, Department of Psychology, University of Groningen, Grote Kruisstraat 2/I, 9712 TS Groningen, Netherlands

ARTICLE INFO

Article history:
Received 23 October 2012
Received in revised form 13 March 2013
Accepted 23 May 2013

Keywords:
Reducing car use
Policy acceptability
Values
Norms

ABSTRACT

Most Latin American countries face important environmental and societal problems associated with an increase in car traffic, and only recently, transport policies aimed at reducing these harmful consequences of car use have begun to be discussed and put on the public agenda of these countries. Surprisingly, little is known about the factors influencing the acceptability of transport policies and intentions to reduce car use in Latin America, as studies on acceptability of transport policies have typically been conducted in Europe. Previous evidence from European samples – where reducing car used had been widely discussed – showed that the Value-Belief-Norm (VBN) theory of environmentalism was an adequate theoretical framework to predict the acceptability of a transport pricing policy, as well as the intention to reduce car use when this policy would be implemented. But can these results be generalised to non-European samples? In this paper, we report results of a questionnaire study among 160 participants from Buenos Aires, Argentina, aimed to test the VBN theory. We found that the VBN theory was indeed also successful in explaining policy acceptability and intention to reduce car use in Argentina. In addition, we found support for the causal structure of the variables in VBN theory. Interestingly, biospheric and hedonic values were also directly and significantly related to feelings of moral obligation when intermediate variables were controlled for. These results suggest that normative considerations, activated by values, indeed predict policy acceptability and the intention to reduce car use in Argentina and that these considerations should be taken into account to increase the acceptability of policies aimed at reducing car use.

© 2013 Elsevier Ltd. All rights reserved.

1. Introduction

Motorisation rate is defined as the number of passenger cars per 1000 inhabitants. Together with an increase in GDP per capita in Central and South America, motorisation augmented from 133.6 to 169.7 in the period 1999–2009 (Clean Air Institute, 2012). This is also true for Argentina. For example, in 2011, there was a 4.9% increase in the number of cars circulating in the roads that lead to Buenos Aires city and a 30% increase in new car sales (INDEC, 2012). This increase in the amount of cars has numerous environmental consequences, including the aggravation of air and noise pollution, more extensive use of non-renewable energy sources and higher CO_2-emissions, together with other societal problems such as traffic jams and car accidents.

Accordingly, it is widely acknowledged that transport policies need to be implemented in order to reduce the harmful consequences associated with car use. In this respect, pricing policies may be effective in reducing car use, for example,

* Corresponding author. Tel./fax: +54 0381 4361936.
E-mail addresses: adrianajak@gmail.com (A. Jakovcevic), e.m.steg@rug.nl (L. Steg).
[1] Tel.: +31 50 363 6482.

1369-8478/$ - see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.trf.2013.05.005

by increasing the price of parking, gasoline or insurance costs. However, without public support, such policies can hardly be implemented. The objective of this study is to examine which factors are related to acceptability of transport pricing policies and intention to reduce car use if such policies would be implemented in the highly motorised city of Buenos Aires.

Given its negative impact on the environment, car use is a prominent example of environmental behaviour, while car use reductions and acceptability of (pricing) policies aimed to reduce car use reflect pro-environmental behaviour. Several studies have been conducted to examine which factors affect environmental behaviour, and more specifically, car use. As many pro-environmental actions (such as reducing car use or accepting car use reduction policies) imply that people need to give up some individual advantages in order to benefit the environment, there has been a particular interest in the role of moral and normative considerations in explaining pro-environmental actions. It has been shown that values are an important general antecedent of various types of environmental beliefs, norms, intentions and behaviours, including car use (e.g. De Groot & Steg, 2008, 2010; De Groot, Steg, & Dicke, 2008; Honkanen & Verplanken, 2004; Nilsson, Von Borgstede, & Biel, 2004; Nordlund & Garvill, 2002, 2003; Steg, De Groot, Dreijerink, Abrahamse, & Siero, 2011; Steg, Dreijerink, & Abrahamse, 2005; Steg, Perlaviciute, Van der Werff, & Lurvink, in press; Stern, Dietz, & Guagnano, 1998). According to Schwartz (1992), a value is 'a desirable transsituational goal varying in importance, which serves as a guiding principle in the life of a person or other social entity (p. 21)'. The importance of values may differ across persons and cultures, but their structure is believed to be universal. Four types of values appeared to be particularly relevant for understanding environmental beliefs, norms, intentions, behaviour and policy acceptability: hedonic, egoistic, altruistic and biospheric (Steg et al., in press).

Typically, particularly biospheric (reflecting a key concern with the quality of nature and the environment) and, to a lesser extent altruistic values (reflecting concern with the welfare of other human beings) appeared to promote pro-environmental attitudes and behaviours including car use reductions (De Groot & Steg, 2007a, 2008, 2010; Grønhøj & Thøgersen, 2009; Schultz & Zelezny, 1998; Steg et al., 2005, in press; Stern & Dietz, 1994). In contrast, egoistic (reflecting a concern with costs and benefits that affect individual resources) and hedonic values (reflecting a concern with improving one's feelings and reducing effort) appeared to be negatively related to pro-environmental beliefs and behaviours (e.g. Steg et al., 2005); in fact, hedonic and egoistic values were more likely to promote car use (Steg et al., in press).

Values mostly predict behaviour indirectly, via behaviour specific beliefs and personal norms (e.g. De Groot et al., 2008; Nordlund & Garvill, 2003; Poortinga, Steg, & Vlek, 2004; Steg et al., 2005). The Value-Belief-Norm theory of environmentalism (VBN theory; Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999) proposes that values affect behaviour via a process of norm activation. More specifically, different types of environmental behaviour (including car use and acceptability of transport polices as a type of no-activist behaviour in the private sphere; Stern, 2000) are believed to result from personal norms, that is, feelings of moral obligation to perform specific actions (e.g. Black, Stern, & Elworth, 1985; De Groot & Steg, 2009; De Groot et al., 2008; Harland, Staats, & Wilke, 1999; Schwartz, 1977; Schwartz & Howard, 1981; Steg & De Groot, 2010). Personal norms are activated when someone acknowledges that not acting pro-environmentally will lead to negative consequences for others or the environment (awareness of consequences) and when someone feels responsible for these negative consequences and thinks one's own contributions will help to alleviate the problems (ascription of responsibility). That is, an individual should first be aware of the problems caused by the relevant behaviour before considering to what extent one contributes to the problems and whether one could contribute to their solution, which in turn determines the extent to which personal norms are activated (De Groot & Steg, 2009; Steg & De Groot, 2010). In turn, values affect the extent to which one is aware of the problems, but may also predict variables further down the causal chain directly (Steg et al., 2005; Stern, 2000). As explained above, stronger altruistic and particularly biospheric values will generally be associated with being more aware of the problems, while problem awareness is likely to be lower among those with strong hedonic and egoistic values (cf. De Groot et al., 2008; Steg et al., 2005, in press).

The VBN theory proved to be successful in explaining different types of environmental action (Stern et al., 1999) and the acceptability of energy policies (Steg et al., 2005). In addition, a study by De Groot et al. (2008) found initial support of the VBN theory in the transport domain. They collected data in five European countries (Italy, the Netherlands, Sweden, Czech Republic and Austria) and found that the VBN theory was predictive of the acceptability of a transport pricing policy, as well as the intention to reduce car use when this policy would be implemented. Also, the causal structure as proposed by the VBN theory was supported by the data in this European sample.

An important question is whether these results can be replicated in other cultures, where problems related to car use, and the need to reduce car use has only been recently discussed in the public realm and politics. For example, in Latin American countries such as Argentina, transport policies aimed at reducing car use as well as environmental concern regarding the impact of a growing motorisation rate have only recently begun to be discussed, while these topics have been on the agenda of Western industrialised countries for a long time. As a consequence, environmental and normative considerations as reflected in the VBN theory may be less prominent and therefore less predictive of intentions to reduce car use and acceptability of car pricing policies in Latin America. Also differently from European cities, Latin American cities face stronger structural barriers for reducing car use (e.g. the public transport system is collapsed, and safety for cycling is not guaranteed). This makes it very relevant to understand to what extent values, beliefs and norms, as reflected in VBN theory, explain acceptability and intention to reduce car use in this cultural and economic context not evaluated so far.

There are two reasons to suggest that the VBN theory would be predictive of car use in Argentina as well. First, there is some evidence to suggest that levels of general environmental concern (Dunlap, Gallup, & Gallup, 1993) and awareness of environmental consequences (Milfont, Sibley, & Duckitt, 2010) are similar in Latin America, Europe and the United States. Second, studies suggest that relationships between a range of values and environmental beliefs and behaviour are similar

in a wide range of countries and cultures, including Latin America (Schultz & Zelezny, 1998; Schultz et al., 2005). Therefore, we expect that VBN theory will be predictive of acceptability of car use policies and intentions to reduce car use in Argentina and that we would be able to replicate the findings reported by De Groot et al. (2008), who included a European sample. That is, even though absolute levels of beliefs about the environmental consequences of car use and other VBN variables may be lower in Argentina, as these specific concerns are comparatively new and only recently being discussed, we propose that this will not affect the relationships between VBN variables and the predictive power of the VBN theory.

In sum, we aimed to test to what extent VBN theory predicted the acceptability and possible effects of transport pricing policies on the intention to reduce car use in Latin America, in particular Argentina. We expected that the VBN variables would predict the acceptability of a transport pricing policy, and the possible effects of this policy on intentions to reduce one's car use. Moreover, we expected that the causal structure of the model would be supported, as in the European sample (cf. De Groot et al., 2008), so that the effects of variables further up the causal chain would be significantly weaker when the relevant mediation variables are controlled for. In addition to the study of De Groot et al. (2008), we also included hedonic values in our study, as hedonic values appeared to be an important predictor of environmental beliefs, norms and action, including car use (see Steg et al., in press). As indicated earlier, hedonic values reflect a key concern with improving one's feelings and reducing effort and should therefore be relevant when examining car use, as driving generally implies less effort and more comfort than using other transport modes (e.g. Steg, 2005).

As yet, most studies testing relationships between values, environmental beliefs and behaviour were conducted in Europe and Northern America, while the few studies conducted in Latin America (e.g. Schultz & Zelezny, 1998, 1999; Schultz et al., 2005) did not study biospheric values as a separate value cluster. Hence, it is not clear yet whether a separate biospheric value cluster can be distinguished in Argentina as well, and thus, whether Argentinians also value nature and the environment as such (see De Groot & Steg, 2008). Following Schwartz (1992), we expected that the structure of values is universal. Hence, we expected that hedonic, egoistic, altruistic and biospheric values can also be distinguished empirically in an Argentinian sample.

2. Method

2.1. Respondents and procedure

In 2011, an Internet based questionnaire study was conducted in Buenos Aires, Argentina, where problems associated with car use are a serious trouble. Questionnaire items (VBN variables and the dependent variables) included in the study by De Groot et al. (2008) were translated into Spanish and back translated into English by the first author; both versions were checked by the second author. Then, questionnaires were distributed via a snowball method, similar to the original study. A link to the questionnaire was sent to acquaintances, family, students and colleagues of the first author; respondents were asked to fill out the questionnaire and to send the link to their acquaintances, family and colleagues, and so forth. We explained that the questionnaire comprised questions about their opinion on car use and transport policies. Following APA ethical guidelines, we indicated that their participation was voluntary, that we would process the data anonymously, and that they were free to stop whenever they liked.

A total of 160 respondents completed the questionnaire. Eight respondents did not fill out the value items and 22 did not fill out the VBN variables. Therefore, these 30 cases were not included in the relevant analyses. Because the study was conducted through the Internet, response rate is not known.

Seventy-two per cent of the respondents were female and 28% were male ranging in age from 19 to 65 years with a mean age of 30 years (SD = 9.37). Sixteen per cent of participants were classified as having a low socioeconomic level, 74% middle and 10% as having a high socioeconomic level. The distribution of highest educational level attained showed that 7.14% had achieved secondary school (with only 77.78% of them having finished it), 15.08% technical school (94.74% finished), 67.46% university (11.76% finished) and 10.32% post graduate education (46.15% finished). The level of education of our sample was somewhat higher than the average level of education of Buenos Aires population (INDEC, 2010).[2]

2.2. Measures

2.2.1.Values

Values were assessed by means of an adapted version of Schwartz's value scale (1992) developed by De Groot and Steg (2007a, 2007b, 2008) and recently extended by Steg et al. (in press). This scale consisted of the following 16 values: pleasure, enjoying of life and gratification for oneself (i.e. hedonic values); social power, wealth, authority, influential and ambitious (i.e. egoistic values); equality, a world of peace, social justice and helpful (i.e. altruistic values); preventing pollution, respecting the earth, unity with nature, and protecting the environment (i.e. biospheric values). Following Schwartz (1992) and Steg et al. (in press), respondents indicated to what extent these values were important 'as a guiding principle in their lives' on a

[2] According to 2010 Argentina census data, for the same age range than our sample a 19.5% of the Buenos Aires population did not attend primary education, 10.5% attended primary level, 25.2% secondary level, 12.3% technical school, 28.9% university level and 3.6% attended post graduate education.

nine-point scale ranging from −1 'opposed to my values', 0 'not important' to 7 'extremely important'. They were urged to vary their scores as much as possible and to rate no more than two values as extremely important.

2.2.2. Problem awareness, ascription of responsibility, and personal norms

Respondents indicated to what extent they agreed with 19 items reflecting their awareness of the consequences of problems caused by car use (AC), ascription of responsibility (AR) and personal norms to reduce car use (PN; see Table 1), on a scale ranging from 1 'fully disagree' to 5 'fully agree'. As in the original study, all items focused on car use.

2.2.3. Intention to reduce car use and acceptability of doubling of car costs

Two dependent variables were included in the questionnaire. Respondents were asked to evaluate the following transport pricing policy: '*Imagine that the government doubled the prices of car use. Increasing the cost of parking, fuel levies, transport pricing measures, and increases in insurance costs would mean that for each car you use you would pay 100% more than you currently do*'. Respondents first indicated their intention to change car use when this policy would be implemented. The following questions aimed to measure intention: 'If this policy was implemented, I would: (a) drive less, (b) travel more with other transport modes instead of the car, (c) trade my car for a cheaper car, (d) buy a small, more efficient car, and, (e) get rid of my car'. Responses could range from 1 'definitely not' to 5 'certainly'. The answer possibility 'not applicable' was included as well, because some respondents did not travel by car, own a car and/or have a driver's licence; this was coded as a missing value. Moreover, as this question was only relevant for those who drive, this category was coded as a missing value for those who do not have a car or a driver's licence ($N = 51$). We computed the mean score on the 5 items, so scores ranged from 1 'no intention to change car use' to 5 'strong intention to change car use'. Cronbach's alpha of this scale was .76 ($M = 3.06$; SD = 0.82; $N = 79$).

Second, acceptability of this policy was evaluated. Different from intention, this question was relevant to all respondents, whether they do or do not drive. Acceptability was measured by the following 5 items 'If this policy was implemented: (a) I would protest against it; (b) I would resign myself to it; (c) I would accept it; (d) I would feel that the policy was unfair to me; (e) I would agree with it'. Responses could range from 1 'definitely not' to 5 'certainly'. Items a and d were reversed before computing the mean score on these items, as to make sure that higher scores on each item reflected higher acceptability; the scale scores could thus range from 1, meaning that people think the measure is not acceptable at all, to 5, meaning people think the measure is very acceptable. Cronbach's alpha of this scale was .85 ($M = 2.92$; SD = 1.01; $N = 125$).

2.3. Data analyses

The multiple group method (MGM), a simple and effective type of confirmatory factor analysis (e.g. Nunnally, 1978; Stuive, 2007), was used to verify whether the data supported the groupings of aspects into the four types of values. Additionally, MGM was used to test whether the VBN variables could indeed be distinguished empirically.

Table 1
Corrected correlations between AC, AR and PN items and AC, AR and PN components through multiple group method.

	AC	AR	PN
AC items			
1. Car use causes exhaustion of scarce resources, such as oil	**.38**	.37	.19
2. Car use takes up a lot of space resulting in less space for cyclists, pedestrians and children	**.53**	.44	.50
3. Car use is an important cause of traffic-related accidents	**.37**	.28	**.37**
4. Car use reduces urban quality of life due to traffic noise and odour nuisance	**.33**	**.33**	.30
5. By reducing car use the level of air pollution will decrease	**.49**	.28	.34
AR items			
1. I feel joint responsibility for the exhaustion of fossil fuels by car use	.34	**.48**	.43
2. I am jointly responsible for the problems caused by car use	.44	**.59**	.42
3. Not just others, like the government, are responsible for heavy traffic, but me too	.45	**.51**	.40
4. In principle, one person cannot decrease the problems of car use[a]	.20	**.21**	.19
5. I feel joint responsibility for the contribution of car traffic to global warming	.54	**.55**	.49
6. My contribution to the problems of car use is negligible[a]	.01	**.27**	.21
PN items			
1. I feel personally obliged to travel in an environmentally sound way, such as by using a bicycle or public transport	.38	.29	**.68**
2. I would be a better person if I used more often other transport modes instead of the car	.38	.40	**.52**
3. People like me should do whatever they can to minimise their car use	.49	.59	**.67**
4. I feel obliged to take the environmental consequences of car use into account when making travel choices	.46	.43	**.69**
5. I don't feel guilty when I use the car even though there are other feasible transport alternatives available[a]	.36	.37	**.67**
6. If I buy a new car, I feel morally obliged to buy an energy-efficient car	.35	.32	**.60**
7. I feel morally obliged to use the car as little as possible, regardless of what other people do	.43	.57	**.75**
8. I don't feel personally obliged to use the car as little as possible[a]	.27	.35	**.60**

Note: AC: awareness of consequences; AR: ascription of responsibility; PN: personal norm. For each item, the highest correlation is printed in bold. The correlations between items included in a scale and the specific scale itself were corrected for 'self-correlations', i.e. in this case, corrected-item total correlations are printed. Items were presented to respondents in random order.

[a] Scores on these items were reversed as to make higher scores reflect higher awareness of consequences and stronger personal norm, respectively.

Table 2
Corrected correlations between value items and value clusters via multiple group method.

	Value cluster			
	Hedonic values	Egoistic values	Altruistic values	Biospheric values
Hedonic value items				
1. Pleasure	**.67**	.31	.28	.26
2. Enjoying life	**.65**	.16	.16	.14
3. Gratification for oneself	**.66**	.22	.19	.17
Egoistic value items				
4. Social power	.08	**.54**	−.05	.03
5. Wealth	.35	**.56**	−.02	−.03
6. Authority	.10	**.63**	−.09	−.06
7. Influential	.24	**.50**	−.03	−.05
8. Ambitious	.23	**.48**	−.10	−.09
Altruistic value items				
9. Equality	.13	−.10	**.46**	.37
10. Social justice	.15	−.05	**.37**	.33
11. A world at peace	.22	−.05	**.55**	.40
12. Helpfulness	.19	−.03	**.39**	.20
Biospheric value items				
13. Respecting the earth	.22	.01	.38	**.75**
14. Unity with nature	.26	−.01	.30	**.61**
15. Protecting the environment	.20	−.12	.49	**.81**
16. Preventing pollution	.12	−.09	.40	**.78**

Note. Correlation coefficients are corrected for self-correlations. Highest correlations for each value item are printed in bold.

Next, we tested VBN theory by means of a series of regression analyses, following the same procedure as the original study by De Groot et al. (2008). We regressed each variable onto the preceding variable in the causal chain. In the first step, the variable directly preceding the dependent variable was entered in the regression analysis (model 1). Next, it was examined whether any of the other preceding variables explained additional variance in the dependent variable (model 2). By doing so, we could examine whether variables also directly affect variables further down the chain when intermediate variables are controlled for. For all tests, statistical significance was considered at $p < 0.05$ (two-tailed).

To test the mediation hypothesis that (a) PN mediated the relationship between AR and intention to reduce car use and between AR and the acceptability of the pricing policy, (b) AR mediated the relationship between AC and PN, and (c) AC mediated the relationship between the four values and AR, we conducted multiple mediation analysis, using the bootstrap procedure as recommended by Preacher and Hayes (2004). A bootstrap[3] resample procedure calculated the indirect effect of each independent variable on the corresponding dependent variable. By mean of this procedure, we tested whether the independent variable influences the dependent indirectly, via the mediator variable, which means that the effect of the independent on the dependent is substantially weaker when the mediator is controlled for. We conclude that this is the case when the bootstrap procedure reveals that zero is not included in the 95% confidence interval estimated from the 5000 resamples (as recommended by Preacher and Hayes (2008)). If so, we can conclude that the null hypothesis stating that the indirect effect is equal to zero can be confidently rejected, and hence, that the independent variable indeed influences the dependent variable via the mediator variable.

3. Results

3.1. Validation of value structure

A MGM revealed that each value item correlated strongest to the value cluster with which it was assigned on theoretical grounds (see Table 2), providing first empirical support for the distinction between the four value clusters in an Argentinian sample. The reliability of the value scales was satisfactory to good; Cronbach's alpha was .81 for the hedonic value scale ($M = 5.10$; SD = 1.42), .77 for the egoistic ($M = 2.12$; SD = 1.43), .66 for the altruistic ($M = 5.44$; SD = 1.14) and .88 for the biospheric value scale ($M = 4.91$; SD = 1.51). We therefore computed the mean score of items assigned to each of the value scales.

[3] The multiple mediation analysis with bootstrapping conducted in the present study was preferred above the causal step strategy (Baron & Kenny, 1986) because it increases power, reduces Type I error, does not impose the assumption of normality, and does reduce parameter estimation bias normally present in simple mediation models due to omitted variables (Preacher & Hayes, 2008).

Table 3
Multiple regression analyses to test the causal chain of VBN theory.

	β	t	p	Adj R^2	F	p
DV: Intention						
Model 1				.14	14.02	<.01
PN	.34	3.74	<.01			
Model 2				.22	4.16	<.01
PN	.25	2.18	.03			
AR	−.07	−.52	.61			
AC	.23	1.75	.08			
Hedonic values	.13	1.67	.10			
Egoistic values	−.01	−.08	.94			
Altruistic values	.18	2.15	.03			
Biospheric values	−.01	−.18	.86			
DV: Acceptability						
Model 1				.12	17.71	<.01
PN	.39	4.21	<.01			
Model 2				.14	3.81	<.01
PN	.50	3.96	<.01			
AR	−.18	−1.23	.22			
AC	.15	.99	.33			
Hedonic values	.05	.74	.46			
Egoistic values	−.04	−.62	.54			
Altruistic values	−.05	−.59	.55			
Biospheric values	−.12	−1.80	.07			
DV: PN						
Model 1				.31	58.4	<.01
AR	.66	7.64	<.01			
Model 2				.45	18.35	<.01
AR	.35	3.69	<.01			
AC	.41	4.18	<.01			
Hedonic values	−.07	−1.51	.13			
Egoistic values	−.09	−1.85	.07			
Altruistic values	.02	.39	.7			
Biospheric values	.15	3.02	<.01			
DV: AR						
Model 1				.26	45.92	<.01
AC	.57	6.78	<.01			
Model 2				.32	13.23	<.01
AC	.52	6.38	<.01			
Hedonic values	−.12	−2.72	<.01			
Egoistic values	.04	.83	.41			
Altruistic values	.04	.74	.46			
Biospheric values	.13	2.9	<.01			
DV: AC				<.01	1.26	.29
Hedonic values	−.01	−.3	.77			
Egoistic values	−.03	−.6	.55			
Altruistic values	.06	.95	.35			
Biospheric values	.06	1.25	.21			

Note. DV: dependent variable; AC: awareness of consequences; AR: ascription of responsibility; PN: personal norms.

3.2. Validation of problem awareness, ascription of responsibility, and personal norms scales

In addition, a MGM revealed that the a priori assignment of items into PN, AC and AR components was supported by the data, although the items '*Car use is an important cause of traffic-related accidents*' and '*Car use reduces urban quality of life due to traffic noise and odour nuisance*' correlated equally strong with the PN and AR components (see Table 1). Therefore, we computed the mean scores of items assigned to each scale. Cronbach's alpha was .66 for AC beliefs ($M = 3.82$; SD = .91), .70 for AR beliefs ($M = 3.11$; SD = .81), and .88 for PN ($M = 2.91$; SD = .95).

3.3. Test of the Value-Belief-Norm theory

Table 3 shows the results of the regression analyses aimed to test the VBN theory. PN explained 14% of the variance in intention to reduce car use when the pricing policy would be implemented. Stronger PN was associated with a stronger intention to reduce car use ($\beta = .34$, $p < .01$). When AR, AC and values were entered in the regression analysis as well, 22% of the variance was explained. As expected, PN contributed most strongly to this model ($\beta = .25$, $p < .05$). Next to PN, altruistic values contributed significantly to the model ($\beta = .18$, $p < .05$): PN was stronger among those with stronger altruistic values.

Table 4
Bootstrap analysis and statistical significance of indirect effects.

Independent variable	Mediator variable	Dependent variable	Indirect effect	*SE*	95% confidence interval for indirect effect
AR→	PN→	Intention	.22	.09	.02–.48*
AR→	PN→	Acceptability	.32	.09	.16–.50*
AC→	AR→	PN	.26	.07	.15–.41*

Note. AC: awareness of consequences; AR: ascription of responsibility; PN: personal norms.
* The 95% confidence interval excludes zero and therefore is significant at $p < .05$.

PN explained 12% of the variance in acceptability judgments. Stronger PN was associated with evaluating the transport pricing measure as more acceptable ($\beta = .39$, $p < .01$). When all VBN variables were entered in the regression analysis, 14% of the variance was explained. Only PN contributed significantly to this model ($\beta = .50$, $p < .01$).

Table 3 also shows the additional regression analyses to test the causal chain of the VBN. AR explained 31% of the variance in PN. The more respondents felt responsible for the problems related to car use, the stronger they felt morally obliged to reduce their car use ($\beta = .66$, $p < .01$). The full model including all variables preceding PN explained 45% of the variance in PN. AC, AR and biospheric values contributed significantly to this model. The more respondents were aware of the problems caused by car use ($\beta = .41$, $p < .01$), the more they felt responsible for car use problems ($\beta = .35$, $p < .01$), and the stronger their biospheric values ($\beta = .15$, $p < .01$), the more they felt morally obliged to reduce car use.

AC explained 26% of the variance in AR. As expected, respondents who were highly aware of the problems related to car use felt more responsible for these problems ($\beta = .57$, $p < .01$). The four values and AC together explained 32% of the variance in AR. Again, AC contributed significantly to this model ($\beta = .52$, $p < .01$). Biospheric and hedonic values also contributed to the explanation of AR: respondents who had stronger biospheric ($\beta = .13$, $p < .01$) and those who had weaker hedonic values ($\beta = -.12$, $p < .01$) felt more responsible for problems related to car use.

Finally, in contrast to our expectation, the four values did not significantly predict AC (Adj. $R^2 = .01$, $p > .05$). Apparently, values mainly predicted variables further down the causal chain.

3.4. Mediation effects

Table 4 displays the bootstrapped estimates for the indirect effects and shows that the tested indirect (mediated) effects were significant in all cases, as the 95% confidence intervals did not include zero. Therefore, our predictions for mediation were supported for PN and AR. That is, PN indeed mediated the relationship between AR and intention to reduce car use and between AR and the acceptability of the pricing policy, as the relationship between AR and the two dependent variables was significantly weaker when PN was controlled for. In addition, as expected, AR mediated the relationship between AC and PN, as the relationship between AC and PN was significantly weaker when AR was controlled for. We could not establish the mediation role for AC between the four values and AR as the four values did not predict AC, so the pre-conditions to establish mediation were not met in this case.

4. Discussion

To our knowledge, this is the first study aimed to test VBN theory in Argentina in the domain of car use. Most importantly, our results showed that the VBN theory is predictive of intention to reduce car use and acceptability of a transport pricing policy in Argentina. As such, this study replicated the findings from a study in Europe reported by De Groot et al. (2008) in a Latin American sample. Our findings suggest that even in a context where the problems associated with car use have become only recently a topic of public concern (compared to European countries), and environmental problems are not a prominent topic on the public agenda, environmental actions (in particular intentions to reduce car use and acceptability of transport pricing policies) depend on normative considerations, which are activated by values, in particular biospheric values. This implies that values and normative considerations as reflected in VBN theory are also predictive of intentions and policy acceptability when environmental issues are not prominent in the public debate.

Furthermore, in accordance with VBN theory and previous findings of De Groot et al. (2008), we found support for the causal structure proposed by VBN theory. That is, except for the relationship between the four values and AC, each variable was related to its preceding variable further up the chain. As acknowledged by VBN theory, the percentage of explained variance tended to increase when other variables further up the chain were introduced in the model as well. In addition, we found support for the proposed mediation effects: effects of variables further up the causal chain were significantly weaker when the relevant mediation variables were controlled for. However, some differences were observed when comparing our results with the results reported by De Groot et al. (2008) based on a European sample. Whereas PN indeed mediated the relationship between AR and intention and between AR and acceptability of the car pricing policy, and AR mediated the relationship between AC and PN, AC did not meditate the relationship between the four values and AR. Rather, values appeared to predict AR and PN directly, even when mediating variables were controlled for. A direct relationship between values and

other variables further down the chain was observed in previous studies as well (De Groot et al., 2008; Nordlund & Garvill, 2003; Steg et al., 2005). This suggests that values may influence a wide range of environmentally-relevant beliefs directly as well as indirectly, suggesting that it is important to examine the role of values in the environmental domain.

In addition, our study replicated the distinction into hedonic, egoistic, altruistic and biospheric values proposed by Steg et al. (in press) in an Argentinian sample, and thus validates our assumption that the structure of values is similar across countries and cultures (cf. Schwartz, 1992). This again demonstrates the significance of environmental considerations in Argentina: biospheric values appear to be recognised by Argentinians as a separate value cluster, suggesting that environmental concerns have become a part of morality in this country as well. Furthermore biospheric values were relatively strongly endorsed in our Argentinian sample, and interestingly, mean scores on biospheric values were very similar to the original study conducted in Europe (4.9 versus 5.0, respectively). In addition, biospheric values were predictive of VBN variables, in particular personal norms and responsibility feelings. This reinforces and expands previous findings which showed that environmental concern and universalism values were also important in less developed countries (Dunlap et al., 1993; Schultz & Zelezny, 1999; see also Steg & De Groot, 2012) and contradicts positions that states that people in less wealthy countries are more concerned about their material resources than about natural commons (e.g. Inglehart, 1977). A strong endorsement of biospheric values suggests that people are not only concerned about the environment but that they have also internalised the protection of the environment as a guiding principle in their lives. This indicates that such considerations can be addressed in policies aimed to promote sustainability, including sustainable transportation in Argentina as well.

Also in accordance with our expectations and in line with previous studies (De Groot & Steg, 2007a, 2008, 2010; Grønhøj & Thøgersen, 2009; Steg et al., 2005, 2011, in press), biospheric values (reflecting self-transcendence values) were positively related to environmental beliefs, while hedonic values (reflecting self-enhancement values) were negatively related to these beliefs. This result further reinforces the importance of biospheric values in the explanation of environmental behaviour, such as car use. Moreover, our study confirms that it is important to distinguish two types of self-enhancement values (hedonic versus egoistic) next to two types of self-transcendence values (biospheric and altruistic) to understand environmental beliefs and actions and that hedonic values are relevant to understand car use and acceptability of transport policies (cf. Steg et al., in press).

Our study is one of the first studies examining the role of normative considerations in understanding sustainable transportation in Argentina, or more generally, Latin America. However, our study has some limitations that should be taken into account when interpreting the results. First, the sample was not fully representative of the Argentinian population as we used a convenience sample. As a consequence, education level was relatively high in our sample, men were underrepresented, and we only included citizens from Buenos Aires. Buenos Aires is the most crowded city of the country and traffic problems are more serious here than in less dense areas. Future studies are needed to see whether our results can be replicated with a more representative sample and in other regions within Argentina to further test to what extent VBN theory is also predictive of intentions to reduce car use and acceptability of car use policies in less dense areas. As we were mainly interested in correlational and regression analyses to further test the predictive power of VBN in a different culture, and not in comparing absolute scores on VBN variables with previous studies, we believe a less representative sample is not so problematic, as it is not likely that specific sample characteristics would affect relationships between variables (cf. Schultz et al., 2005). Second, not all respondents in our sample did drive or did have a driving licence, which may have affected the results. Most importantly, for these respondents, the questions on intention to reduce car use when the transport policy would be implemented were not relevant, so we could not include these respondents when examining factors influencing the intention to reduce car use. Despite this, we still found that VBN variables predicted intention to reduce car use, even though the sample was relatively small so power was weaker. Hence, it is unlikely that not including all respondents in this analysis increased the risk of a type II error (that is, finding a nonsignificant due to a too small sample size). However, for studying acceptability of transportation policies, we were able to include all respondents as it is relevant to also include people without a car or without a driving licence, as they will surely have an opinion on the acceptability of such a policy, because it will probably affect their lives as well.

Our results have important implications for transport policies. It seems that reducing car use may best be promoted by emphasising the positive biospheric, altruistic, and hedonic consequences of reducing car use. Governments should highlight the biospheric benefits of driving less such as reducing CO_2 emissions, or its altruistic benefits such as reducing noise and smog in public areas. Alternatively, the use of active transport modes (i.e. cycling, walking) may be promoted by enhancing its hedonic benefits as the pleasure of achieving a better fitness. Interestingly, current campaigns about sustainable transportation in the city of Buenos Aires use slogans that for example states: 'Use the bike, get faster', which mainly focus on the egoistic gains of changing to alternative transport modes such as the bicycle (saving time). According to our results, acceptability and intention to reduce car use are higher among those with strong biospheric and altruistic values and weak hedonic values, so to focus on the environmental, altruistic and hedonic benefits of cycling in comparison to car driving may well be more effective than arguments currently used in campaigning. Also, our results suggest that it is important to strengthen personal norms, by making people more aware of the problems related to car use and to increase their sense of responsibility as the latter will activate personal norms leading to higher acceptability levels and stronger intentions. We think studies like the one reported here can give important new insights to increase the acceptability and effects of sustainable transport policies that are beginning to be considered and implemented in Latin American cities such as Buenos Aires.

It is important to further test whether theories aimed to predict sustainable transportation are valid across different cultures, as this gives important insights in the validity and usefulness of theories. In addition, absolute values on key variables can be compared to study if cultural and structural differences across countries are reflected on them. For example, awareness of consequences could be higher in places where environmental effects of car use are more visible, and personal norm could be weaker in places like Argentina where the use of alternative transport modes is not a good option (as, for example, subways and trains are crowded and suffer important delays daily, and car drivers do not respect cyclists), so reducing car use may not be internalised as a moral norm.

5. Conclusions

In sum, our study revealed that VBN theory is predictive of acceptability of a transport pricing policy and of intention to reduce car use when such a policy would be implemented in a country where the public discussion about reducing car use is comparatively new and structural barriers for alternative transport modes are relatively high. Also, the four value structure widely tested in European countries was replicated and validated in an Argentinian sample, suggesting that biospheric concerns are also part of morality in Argentina. Our results further suggest that especially biospheric and hedonic values should be taking into account when designing policies to promote sustainable transportation.

Acknowledgements

We would specially want to thank Lic. P.A. Franco and Lic. J. Ferreiro for their valuable help in collecting the data. This research received partial financial support from Interdisciplinary Project UBACyT Climatic Change program (2012–2015).

References

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.

Black, J. S., Stern, P. C., & Elworth, J. T. (1985). Personal and contextual influences on household energy adaptations. *Journal of Applied Psychology, 70*, 3–21.

Clean Air Institute (2012). *La Gestión de la Demanda de Transporte: Oportunidades para mitigar sus externalidades y las de los vehículos automotores en América Latina, la Congestión vial y sus Externalidades*. <www.cleanairinstitute.org/gdt_politica/> Accessed 09.12.

De Groot, J., & Steg, L. (2007a). Value orientations and environmental beliefs in five countries: Validity of an instrument to measure egoistic, altruistic and biospheric value orientations. *Journal of Cross-Cultural Psychology, 38*(3), 318–332.

De Groot, J., & Steg, L. (2007b). General beliefs and the theory of planned behaviour: The role of environmental concerns in the TPB. *Journal of Applied Social Psychology, 37*(8), 1817–1836.

De Groot, J. I. M., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behaviour: How to measure egoistic, altruistic, and biospheric value orientations. *Environment and Behaviour, 40*, 330–354.

De Groot, J. I. M., & Steg, L. (2009). Morality and prosocial behaviour: The role of awareness, responsibility and norms in the norm activation model. *Journal of Social Psychology, 149*, 425–449.

De Groot, J. I. M., & Steg, L. (2010). Relationships between value orientations, self-determined motivational types and pro-environmental behavioural intentions. *Journal of Environmental Psychology, 30*, 368–378.

De Groot, J. I. M., Steg, L., & Dicke, M. (2008). Transportation trends from a moral perspective: Value orientations, norms and reducing car use. In F. N. Gustavsson (Ed.), *New transportation research progress* (pp. 67–91). Hauppauge, NY: Nova Science Publishers.

Dunlap, R. E., Gallup, G., & Gallup, A. (1993). Global environmental concern: Results from an international public survey. *Environment, 35*, 7–39.

Grønhøj, A., & Thøgersen, J. (2009). Like father, like son? Intergenerational transmission of values, attitudes, and behaviours in the environmental domain. *Journal of Environmental Psychology, 29*, 414–421.

Harland, P., Staats, H., & Wilke, H. (1999). Explaining proenvironmental behaviour by personal norms and the theory of planned behaviour. *Journal of Applied Social Psychology, 29*, 2505–2528.

Honkanen, P., & Verplanken, B. (2004). Understanding attitudes towards genetically modified food: The role of values and attitude strength. *Journal of Consumer Policy, 27*, 401–420.

INDEC (2010). *Censonacional de población, hogares y viviendas 2010*. <http://censo2010.indec.gov.ar/resultadosdefinitivos.asp> Accessed 10.12.

INDEC (2012). <http://www.indec.mecon.ar/nuevaweb/cuadros/14/c051103.xls> Accessed 09.12.

Inglehart, R. (1977). *The silent revolution: Changing values and political styles among Western publics*. Princeton, NJ: Princeton University Press.

Milfont, T. L., Sibley, C. G., & Duckitt, J. (2010). Testing the moderating role of the components of norm activation on the relationship between values and environmental behaviour. *Journal of Cross-Cultural Psychology, 41*, 124–131.

Nilsson, A., Von Borgstede, C., & Biel, A. (2004). Willingness to accept climate change policy measures: The effect of values and norms. *Journal of Environmental Psychology, 24*, 267–277.

Nordlund, A. M., & Garvill, J. (2002). Value structures behind proenvironmental behaviour. *Environment and Behaviour, 34*, 740–756.

Nordlund, A. M., & Garvill, J. (2003). Effects of values, problem awareness, and personal norm on willingness to reduce personal car use. *Journal of Environmental Psychology, 23*, 339–347.

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York, NY: McGraw-Hill.

Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern and environmental behaviour: A study into household energy use. *Environment and Behaviour, 36*, 70–93.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behaviour Research Methods, Instruments, & Computers, 36*, 717–731.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879–891.

Schultz, P. W., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., & Franìk, M. (2005). Values and their relationship to environmental concern and conservation behaviour. *Journal of Cross-Cultural Psychology, 36*, 457–475.

Schultz, P. W., & Zelezny, L. C. (1998). Values and pro-environmental behaviour: A five-country study. *Journal of Cross-Cultural Psychology, 29*, 540–558.

Schultz, P. W., & Zelezny, L. C. (1999). Values as predictors of environmental attitudes: Evidence for consistency across 14 countries. *Journal of Environmental Psychology, 19*, 255–265.

Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 221–279). New York, NY: Academic Press.

Schwartz, S. H., & Howard, J. A. (1981). A normative decision making model of altruism. In J. P. Ruston & R. M. Sorrentino (Eds.), *Altruism and helping behaviour: Social, personality, and developmental perspectives* (pp. 189–211). Hillsdale, NJ: Lawrence Erlbaum.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. Zanna (Ed.), *Advances in experimental social psychology* (pp. 1–65). Orlando, FL: Academic Press.

Steg, L. (2005). Car use: Lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part A: Policy and Practice, 39*, 147–162.

Steg, L., & De Groot, J. I. M. (2010). Explaining prosocial intentions: Testing causal relationships in the norm activation model. *British Journal of Social Psychology, 49*, 725–743.

Steg, L., & De Groot, J. I. M. (2012). Environmental values. In S. Clayton (Ed.), *The Oxford handbook of environmental and conservation psychology* (pp. 81–92). New York, NY: Oxford University Press.

Steg, L., De Groot, J. I. M., Dreijerink, L., Abrahamse, W., & Siero, F. (2011). General antecedents of personal norms, policy acceptability, and intentions: The role of values, worldviews, and environmental concern. *Society & Natural Resources, 24*, 349–367.

Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: Testing VBN theory. *Journal of Environmental Psychology, 25*, 415–425.

Steg, L., Perlaviciute, G., Van der Werff, E., & Lurvink, J. (in press). The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. *Environment and Behaviour*. doi:http://dx.doi.org/10.1177/0013916512454730.

Stern, P. C. (2000). Toward a coherent theory of environmentally significant behaviour. *Journal of Social Issues, 56*, 407–424.

Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues, 50*, 65–84.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review, 6*, 81–95.

Stern, P. C., Dietz, T., & Guagnano, G. A. (1998). A brief inventory of values. *Educational and Psychological Measurement, 58*, 984–1001.

Stuive, I. (2007). *A comparison of confirmatory factor analysis methods: Oblique multiple group method versus confirmatory common factor method.* Ph.D. Thesis, University of Groningen, the Netherlands.