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When personal norms predict the acceptability of push and pull car-reduction policies: Testing the ABC model and low-cost hypothesis

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ABSTRACT

Policymakers may be reluctant to implement pro-environmental policies that the public find unacceptable, such as policies intended to reduce car use. It is, therefore, essential to understand factors that influence acceptability of such measures. We aimed to study to what extent policy acceptability of car-reduction policies is related to personal norms to do the “right thing” and perceived costs associated with the policies. We hypothesized, in line with the A-B-C model, that personal norms would be more strongly related to policy acceptability when the policy was associated with moderate personal costs, rather than with very low or high costs. Such a finding would be somewhat contrary to the low-cost hypothesis, which predicts a simple linear relationship between costs and personal norm, such that personal norms become better predictors of acceptability as costs decrease. We tested this hypothesis in two ways, using data from 6045 people from seven European countries. First, we hypothesized and found that personal norms were less predictive of the acceptability of a pull measure involving few external costs (improved provision of public transport) than of a push measure involving a higher degree of cost (increased car-use taxes), across all countries. Second, we hypothesized and found that, overall, personal norms were more predictive of acceptability of the push measure when respondents felt more able to reduce their car use, and thus when the push measure would be associated with lower personal costs. This result was stronger for some countries than for others. We discuss implications for policy.

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1. Introduction

The use of private cars causes serious environmental problems. To alleviate these problems, policymakers seek to implement measures to reduce car use. Such measures can reduce environmental problems at a societal level, because when effective, they will cause many people to change their behavior. However, the implementation of policy measures may be halted if there is little public support for them (Baron & Journey, 1993; Gärling & Loukopoulos, 2007; Jaensirisak, Wardman, & May, 2005; Jones, 2003; Schade & Schlag, 2003). Therefore, it is essential to understand factors that are related to policy acceptability. We define acceptability of a policy measure as the extent to which individuals agree or disagree with the possible future implementation of the policy measure (Schade & Schlag, 2003).

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1.1. Push and pull measures

Some policies aimed to reduce car use, labeled *push* measures (Loukopoulos, 2007; Schade & Schlag, 2003; Steg & Vlek, 1997), will impose external conditions, such as car-use taxes, that involve high costs for car users, as car users must either continue to drive at higher costs, or limit their driving and use less attractive alternatives. Other policies, labeled *pull* measures, will impose fewer costs and external constraints to behavior because they typically aim to change behavior by making alternatives to car use more attractive, such as by improving public transport quality. The implementation of a pull measure typically adds few costs or external barriers to current behavior: Driving a car will not be much more difficult after public transport links have been improved, and car users do not perceive improved public transport to constrain their behavior (Eriksson, Garvill, & Nordlund, 2006). In contrast, push measures aim to change people's behavior by explicitly making their current behavior more difficult, for example, by introducing a sizable car tax that makes driving the car more costly. Thus, one factor expected to affect the acceptability of car-reduction policies is the degree of external constraint, or cost, imposed by the policy (de Groot & Schuitema, 2012; Schade & Schlag, 2003), or the ability of the car user to reduce their car use.

1.2. Personal norms

Many people evaluate car use more positively than alternative modes of transport, such as public transport (Steg, 2003). Therefore, it is unlikely that people will drive less or support car-reduction policies because they prefer to do so, but rather because they feel that it is morally right to do so. Indeed, personal norms are a key factor found to influence pro-environmental behavior, including willingness to reduce car use and acceptability of environmental policies (Eriksson et al., 2006; Nordlund & Garvill, 2003; Steg, Dreijerink, & Abrahamse, 2005). Personal norms reflect an individual's feeling of moral obligation to perform or refrain from specific actions (Schwartz & Howard, 1981); in other words, behavior that they believe is morally right, such as the acceptability of policy measures (Steg et al., 2005). Similarly, stronger personal norms have been associated with a greater willingness to reduce car use (Nordlund & Garvill, 2003). Personal norms are activated when individuals become aware of a problem caused by their behavior and feel that they are responsible and able to solve this problem by taking action (Schwartz, 1977; Schwartz & Howard, 1981; see also Steg & de Groot, 2010). Thus, personal norms incorporate other factors that may predict acceptability, such as feelings of responsibility and problem awareness.

1.3. The low-cost hypothesis

Some researchers, however, have described situations in which personal norms are less predictive of behavior (e.g., Abrahamse, Steg, Gifford, & Vlek, 2009; Blok, Wesselink, Studynka, & Kemp, 2015). For example, personal norms were a strong predictor of intentions to reduce car use, but they were less successful at explaining actual car use (Abrahamse et al., 2009). Therefore, it has been suggested that feelings of moral obligation are likely to be more successful in explaining low-cost pro-environmental behavior, and less successful in situations involving high behavioral costs (Steg & Vlek, 2009). This reasoning is in line with the *low-cost hypothesis* (Diekmann & Preissendörfer, 2003). Applied to acceptability of car-reduction policies, the low-cost hypothesis would assert that personal norms would better predict the acceptability of policies that involve low costs to car drivers than of policies that involve high costs. The rationale is that individuals balance the personal costs of a certain act (in terms of money, time, effort, status, and/or pleasure) against the potential benefits of “doing the right thing”. Specifically, the low-cost hypothesis states that individuals are likely to prioritize avoiding personal costs over their desire to act on their personal norms if the costs of behavior are high, but if these costs are low, individuals are more likely to act upon their personal norms.

The low-cost hypothesis predicts a multiplicative relationship between personal norms and cost. In other words, it predicts an interaction between personal norms and cost such that personal norms become more predictive of behavior with decreasing costs. Initial support for an interaction between personal norms and cost was found by Roberts, Popli, and Harris (2017), who found that the more pro-environmental men's attitudes were, the less likely they were to use the car for regular commuting journeys. However, such attitudes were not predictive of commuting mode for women, who were believed to be more constrained by external conditions, such as the need to transport children. For women, avoiding car journeys was extremely difficult. Attitudes, therefore, were not predictive of their behavior, in contrast to men who faced fewer external barriers to avoiding car use. In contrast, Hunecke, Blöbaum, Matthies, and Höger (2001) found evidence for an additive, rather than multiplicative, effect of personal norms and external costs on environmental behavior. They found that both personal norms and external cost affected the number of subway trips taken by participants, but that there was no interaction between these factors.

Although there has been some research attempting to find evidence for or against an interaction between personal norms and external constraints in relation to actual or intended pro-environmental behavior, we are not aware of any researchers who have studied these factors in relation to policy acceptability. As stated, if a policy proves unpopular, it may not be implemented. The presence of an interaction would imply a different strategy to the implementation of policy than the absence of an interaction. If there is no interaction between personal norms and cost, targeting personal norms, when they are predictive, may be successful irrespective of the costs implied by the policy. If personal norms and cost do interact to predict acceptability, however, targeting personal norms will only be successful (or necessary) for policies that infer lower costs, and not those that infer higher levels of costs.

1.4. The A-B-C model

The low-cost hypothesis, then, predicts a linear, multiplicative, relationship between the predictive power of personal norms and cost. The A-B-C model (first developed by Stern and Oskamp (1987) and further described by Guagnano, Stern, and Dietz (1995)), in contrast, does not predict a linear relationship between the predictive power of personal norms and costs, but rather an inverted U-shaped one. In this U-shaped relationship, personal norms are proposed to be most predictive when behavior is moderately costly. At both extremes of the costliness continuum, the predictive power of personal norms is believed to be lower. Specifically, it is assumed that if costs are very low, anyone would engage in the behavior, irrespective of the strength of personal norms, while if the behavior is very costly, even those with strong personal norms would refrain from engaging in the behavior. Therefore, it follows from the A-B-C model that personal norms will be most predictive of the acceptability of policies that infer a moderate level of cost, and less so of those that infer very low or high costs. For example, although personal norms may predict moderately costly behavior, they are likely not particularly predictive of very-low-cost behavior, such as acceptability of pull policies to reduce car use, as these policies are likely acceptable to everyone, irrespective of the strength of their personal norms.

In our paper, we aimed to show support for the U-shaped relationship predicted by the A-B-C model whereby the effect of personal norm is strongest for a moderate level of cost – that is, under a push policy where people feel better able to reduce their car use – than under conditions of very-low cost (a pull policy) or high cost (a push policy where people felt less able to reduce their car use). As there has been little research attempting to differentiate between the A-B-C model and the low-cost hypothesis, our findings make a valuable contribution to the field.

1.5. Focus of our study

We tested our reasoning in two steps. First, we tested whether personal norms were less predictive of the acceptability of a pull policy to reduce car use that involved very-low costs, and more predictive of a push policy associated with higher costs. As indicated above, when very little personal cost is involved, individuals are likely to engage in a behavior irrespective of whether they have strong personal norms regarding that behavior. Hence, personal norms are unlikely to be strongly related to very-low-cost behavior. Applied to acceptability of policy measures, we expect that personal norms are likely to be less predictive of acceptability of policy measures that are associated with very low costs, and more predictive of acceptability of policy measures associated with *some* personal cost. This prediction is in line with the U-shaped function predicted by the A-B-C model, but is diametrically opposed to the linear relationship proposed by the low-cost hypothesis which suggests that personal norms would become *more* predictive of acceptability as cost decreases. There is some initial evidence for this line of thought. For example, Eriksson et al. (2006, 2008) found that stronger personal norms were associated with acceptability of a push measure but not of a pull measure to reduce car use.

Second, in a context where at least some personal cost is present (the push policy), we tested whether personal norms were less predictive of acceptability when people were less able to reduce their car use (implying high costs of the policy) than when they were better able to do so (implying moderate costs of the policy). A push policy is less costly for people who are able to reduce their car use, and thus, for push measures, ability to reduce car use becomes an important factor. When considering the acceptability of the push policy in the context of our study, both the low-cost hypothesis and the A-B-C model predict a linear relationship whereby personal norms are more predictive of acceptability for people who are better able to reduce their car use (lower cost) than for people who are less able to reduce their car use (higher cost). Although our predictions for the two models are the same here, the test was necessary to provide support for the upper half of the expected U-shaped relationship predicted by the A-B-C model – with the lower half of the U-shaped function tested under Hypothesis 1a. Thus, we assume that the pull policy implies a situation of very low cost, a push policy when drivers are able to reduce their car use (high ability) a situation of moderate cost, and a push policy when drivers are less able to reduce their car use (low ability) a situation of high cost.

1.6. Hypothesis 1a

We hypothesized generally, and in line with the A-B-C model, that personal norms would be particularly predictive of the acceptability of car-use-reduction policies that are associated with moderate costs. We hypothesized, firstly, that personal norms would be more predictive of the acceptability of a push-policy measure compared to the acceptability of a pull policy (Hypothesis 1a). We reasoned that individuals would be more likely to accept the pull policy irrespective of their personal norms towards car-use reduction, because such a measure presents few external barriers, in terms of cost, difficulty, or inconvenience. The push measure, if implemented, would introduce costs for driving. Therefore, an individual's personal norm to reduce car use would need to be stronger for them to indicate support for the policy, and, therefore, we hypothesized that strength of personal norms would significantly predict acceptability of the push measure. Finding support for Hypothesis 1a would be in line with the A-B-C model, and counter to the low-cost hypothesis, because the latter predicts a simple linear relationship between cost and behavior, and would predict that the effect of personal norm becomes *stronger* as cost decreases, and thus that personal norms would be a stronger predictor of the pull policy than of the push policy. The A-B-C model, however, would predict a weakening of the effect of personal norm at very-low levels of cost, which is what we predicted would be imposed by our pull policy. Support for neither the low-cost hypothesis nor the A-B-C model would be

found if personal norms did not predict acceptability of either policy, or if they predicted both the push and pull policies equally well. Support for the low-cost hypothesis, but not the A-B-C model would be found if personal norms predicted acceptability of the pull measure more strongly than acceptability of the push measure.

1.7. Hypothesis 1b

Secondly, to test the relationship between personal norm and acceptability at moderate and high levels of cost, we hypothesized an interaction between personal norms and external constraints in explaining the acceptability of a push policy (Hypothesis 1b). We predicted that the strength of the positive relationship between personal norms and policy acceptability would depend on the cost of the policy to the respondents. For car drivers, a push policy makes the existing behavior of driving more costly. However, for the push measure, a car user's ability to reduce their car use is likely to be an important factor in whether they find the policy to be costly and thus acceptable. Reducing car use is likely to be more difficult for some car drivers than for others, for example, because some people have little or no access to alternative modes of transport, or have little opportunity to avoid trips altogether. Such people are likely to view the policy negatively, because the policy forces them either to continue driving their cars at increased costs or to travel less, which is also difficult, and likely to reduce their freedom to move. Individuals who feel more able to reduce their car use, on the other hand, can at least partly avoid the increased costs caused by the implementation of a push measure by, for example, adopting alternative modes of transport or driving less, meaning that they are likely to perceive the behavior change elicited by such a measure as less personally difficult. Hence, we expected personal norms to be less predictive of the acceptability of push measures for individuals who felt less able to reduce their car use (high cost) than for those who felt better able to do so (moderate cost). In other words, we expected the interaction between personal norms and ability to reduce car use to be significant. Our hypothesis would be refuted by data showing an additive, rather than a multiplicative, relationship between personal norms and difficulty in their prediction of acceptability. That is, Hypothesis 1b would not be supported if the interaction between personal norms and difficulty (ability to reduce car use) was not significant and, instead, personal norms predicted acceptability equally well at all levels of ability to reduce car use.

We collected data on acceptability of hypothetical policy measures, personal norms to reduce car use, and ability to reduce car use in seven European countries. This approach allowed us to test our hypotheses both across and within different contexts, and to test the robustness of our findings, providing a stronger test of the hypotheses.

3. Method

3.1. Participants

We conducted an online questionnaire study using large representative samples of the populations of France, Greece, Hungary, the Netherlands, Norway, Switzerland, and the United Kingdom (UK). Advanced Market Research (AMR) selected participants based on a number of stratification criteria (i.e., gender, age, household income, education level, marital status, and household composition), and 7703 (approximately 1100 per country) completed the questionnaire. To ensure the quality of the data, we removed a number of participants from the data sets because of their irregular answering patterns.¹ After the application of these criteria, we included 6045 participants in the analyses (France: 881, Greece: 918, Hungary: 856, Netherlands: 758, Norway: 843; Switzerland: 940, UK: 849). The average age of the included participants was 44 years, 95% CI[43.66, 44.40]; 50.8% female.

3.2. Procedure

Participants first completed a set of questions on car use, personal norms to reduce car use, and perceived ability to change one's car use. Next, they indicated the extent to which they found six policy measures acceptable. Two of the policy measures were related to car use and focused either on a pull or push measure; these measures were included as dependent variables in this study. All questions were presented in the dominant language of each country. The questionnaires were translated from English into the dominant language and then back-translated to assure the integrity of the translation.

3.3. Measures

Acceptability of policy measures. Participants rated the acceptability of two policy measures targeting car use (one push, one pull measure) on 7-point scales, ranging from 1 (very unacceptable) to 7 (highly acceptable). The push measure was 'An increase of car-use costs through taxes on car ownership and car fuel of 30%'. The pull measure was 'Improvement of public transport – increased frequency of public transport service and the opening of new public transport routes.'

¹ We removed data for participants who answered more than 2/3 of all questions from one question battery identically and who filled out improbable answers in quality control questions in which we asked participants to respond to a question with a number we specified.

Personal norms. Participants indicated the extent to which they agreed with three items on a scale ranging from 1 (strongly disagree) to 7 (strongly agree): 'I feel morally obliged to reduce the percentage of trips I travel by car,' 'I would violate my principles if I would not try to reduce my car use,' and 'I feel guilty if I do not try to reduce the percentage of journeys I travel by car.' We combined these items to create the personal-norms scale. The reliability of the resulting scale was high (Cronbach's $\alpha = 0.81$; range in different countries between 0.77 and 0.83). Scores on the scale were approximately normally distributed. The mean and median scores on the personal-norms scale were identical and slightly below the midpoint of the scale ($M = 3.7$, 95% CI[3.66, 3.74]).

Ability to reduce car use. Participants indicated the extent to which they agreed with the following two items on a scale ranging from 1 (strongly disagree) to 7 (strongly agree): 'It is possible for me to reduce my car use in the next year,' and 'I could reduce my car use in the next year.' We combined these items to create the ability-to-reduce-car-use scale. The reliability of this scale was high (Cronbach's $\alpha = 0.86$; range in different countries between 0.84 and 0.89). Scores on the scale were approximately normally distributed. The mean score on ability to reduce car use was 3.8 (95% CI[3.75, 3.85]; range in different countries between 3.4 and 4.1), which was slightly lower than the median of 4.0.

3.4. Analysis strategy

All analyses were performed in SPSS25[®]. To test Hypothesis 1a, that personal norms would be less predictive of the acceptability the pull measure than of the push measure, we ran two linear regressions combining participants from all countries, both using personal norms as the predictor variable and one using acceptability of increasing car-use taxes (push measure) as the outcome variable and the other the acceptability of public-transport improvement (pull measure).² We compared the amount of variance (R^2) that personal norms accounted for in the acceptability of the pull measure with the R^2 for the acceptability of the push measure. We calculated 84% confidence intervals around these R^2 values, as recommended by Austin and Hux (2002) and Payton, Greenstone, and Schenker (2003) and concluded that the R^2 values for the two policy measures were significantly different if the confidence intervals did not overlap. According to Austin and Hux and Payton et al., when the standard errors are approximately equal, which they were in our study, then a comparison of 84% confidence intervals approximates a significance test at the $\alpha = 0.05$ level, whereas 95% confidence intervals would constitute a very conservative test. We repeated this analysis separately for each country.

To test Hypothesis 1b, that personal norms would be more predictive of a push measure to reduce car use for individuals who feel more able to reduce their car use than for those who feel less able to do so, we ran a moderated multiple regression (MMR), using PROCESS 3.3, including acceptability of increasing car-use taxes as the outcome variable, personal norms as the independent variable, and ability-to-reduce-car-use as a moderator variable. To avoid issues with multicollinearity, we instructed the programme to use mean centering to produce an interaction term, *personal-norms-x-ability*. To assist with the interpretation of the interaction effect, we conducted a simple-slopes analysis (Aiken & West, 1991) using PROCESS and calculated slopes of lines fitted to mean acceptability scores predicted from personal norms at *low* (1SD below the mean of ability-to-reduce-car-use), *medium* (at the mean of ability-to-reduce-car-use), and *high* (1SD below the mean of ability-to-reduce-car-use) ability levels. We ran the same analyses separately for each individual country.

4. Results

4.1. Step 1; Hypothesis 1a

Overall. Descriptively, Fig. 1 shows that respondents in every country consistently rated the push measure as unacceptable and the pull measure as highly acceptable, with the 95% confidence intervals showing that this difference was significant for every country.

Regression analysis revealed that, overall, personal norms to reduce car use accounted for 9.2% of the variance in the acceptability of the push measure, a car-use tax increase, $F(1, 6043) = 615.90$, $p < .001$, 84% CI[8.2–10.3]. However, personal norms only accounted for 1.5% of the variance in acceptability of the pull measure, improving public transport, in the seven countries, $F(1, 6043) = 91.58$, $p < .001$, 84% CI[1.1–2.0]. The lack of overlap in the 84% confidence intervals indicates that the difference in variance in acceptability accounted for in the two policy measures was significant, providing support for Hypothesis 1a.

By country. Table 1 shows that personal norms towards reducing car use were significantly more predictive of acceptability of car-use tax increases (the push measure) than of public-transport improvements (the pull measure) in all seven countries, indicated by the lack of overlap between the 84% confidence intervals around the R^2 values in all countries.

² Although we met all other assumptions for the regressions, the model residuals for acceptability of the pull policy were not normally distributed. While we attempted to transform the scores of this variable, the residuals remained negatively skewed. The skew was a result of participant scores on this variable being concentrated at the high end of the scale, representing the fact that most participants found the policy to be highly acceptable. While we acknowledge this limitation, we note that the linear regressions performed on the individual country data produced similar results, providing some confidence in the results. Additionally, regression analysis has been shown to be extremely robust to violations of assumptions, leading some statisticians (e.g., Murray, 2013; Norman, 2010) to conclude that parametric statistics can be used with Likert data which have non-normal distributions and unequal variances without reaching incorrect conclusions.

Fig. 1. Acceptability scores for each country for the push measure (increased car tax; left plots, shaded boxes) and the pull measure (improved public transport; right plots, white boxes). Horizontal lines drawn through the boxes represent the median, the boxes show the upper and lower quartiles where 50% of the data lie, and the lines extend from the boxes to the minimum or maximum value recorded. Small data points within the boxes represent the mean, with error bars showing the 95% confidence intervals around the mean.

Table 1

Multiple regression results for each country.

Country	N	Car-use tax increase				Improvement in public transport			
		F	p	R ²	84% CI	F	p	R ²	84% CI
France	881	61.3	<.001	6.5	4.3, 8.7	23.5	<.001	2.6	1.1, 4.1
Greece	918	68.7	<.001	7.0	4.7, 9.3	14.5	<.001	1.6	0.4, 2.8
Hungary	856	79.84	<.001	8.5	5.9, 11.1	0.65	.42	0.1	−0.2, 0.4
Netherlands	758	164.9	<.001	17.9	14.4, 21.4	21.3	<.001	2.7	1.1, 4.3
Norway	843	206.8	<.001	19.7	16.3, 23.1	8.2	.004	1.0	0, 2.0
Switzerland	940	108.5	<.001	10.4	7.8, 13.0	10.1	.002	1.1	0.2, 2.0
UK	849	55.8	<.001	6.2	4.0, 8.4	3.1	.08	0.4	−0.2, 1.0

4.2. Step 2; Hypothesis 1b

Overall. For the push measure, the MMR model containing personal norms, ability to reduce car use, and their interaction term as predictors and acceptability of a car-use-tax increase as the outcome variable was significant, $F(3, 6041) = 186.37$, $p < .001$, $R^2 = 0.10$. The strongest predictor of acceptability of the push policy was personal norms to reduce car use, $b = 0.26$, $t(6041) = 15.48$, $p < .001$, with stronger personal norms towards car-use reduction predicting greater acceptability of the tax increase. Additionally, the more individuals felt able to reduce their car use, the more acceptable they found the push policy, $b = 0.09$, $t(6041) = 6.13$, $p < .001$. More importantly, we found a personal-norms-by-ability interaction effect, $b = 0.03$, $t(6041) = 3.32$, $p < .001$. The relationship between personal norms and acceptability of the push measure became stronger as the ability to reduce car use increased. At all levels of ability to reduce car use, personal norms were significantly predictive of acceptability ($p < .001$), but the slope of the lines fitted to personal norms and acceptability increased as ability to reduce car use increased (low: $b_1 = 0.21$; mean: $b_1 = 0.26$; high: $b_1 = 0.30$; Fig. 2).

By country. When the MMR models were repeated separately for each of the seven countries, results were more mixed (Table 2). Again, we found that personal norms were significantly predictive of acceptability of a push measure in all seven countries. Additionally, ability to reduce car use was significantly predictive in five of the seven countries (the Netherlands and Switzerland being the exceptions). However, we found the expected personal-norms-by-ability-to-reduce-car-use interaction effect only for the UK and Norway, but not for the other five countries. These results mean that personal norms were more predictive of the acceptability of a push measure among individuals who were better able to reduce their car use for only two of the seven countries.

Despite the non-significant interaction effects, we ran a similar slope analysis for individual countries as we did for the overall data, as described in the Analysis Strategy section. Fig. 2 displays mean acceptability scores as a function of personal norms grouped by three ability levels, determined by PROCESS software as described above, for each country and for the overall dataset. The results of t tests determining whether the slopes of the lines shown in Fig. 2 were significantly different to zero are given in Table 3. The positive relationships between mean acceptability scores and both personal norms and ability level can clearly be seen in all but one case, that of the Netherlands, where there was no significant relationship between

Fig. 2. Plots of simple slope equations of the regression of personal norms on acceptability scores at three levels of ability to reduce car use (low = 1SD below the mean; high = 1SD above the mean) where the interactions were (bottom row) and were not significant (top two rows).

ability level and acceptability (Table 2). In almost all cases, personal norm was significantly positively related to acceptability at all three levels of ability to reduce car use. The only exception was for the UK, where personal norms were not significantly related to acceptability when ability to reduce car use was at the lowest level. The lack of relationship is demonstrated by the flatness of the line in Fig. 2.

The interaction between personal norms and ability can be clearly seen in Fig. 2 for Norway, the UK, and for all country data combined (bottom row), and these interactions were significant. The lines plotted in Fig. 2 for Hungary, the Netherlands, and Switzerland (middle row) also show steepening slopes as ability increases over the groups, however these interactions did not reach significance. The lines for France and Greece (top row) were virtually parallel, showing no interaction.

5. Discussion

Our aim was to test whether personal norms would be more predictive of the acceptability of a car-reduction policy that infers a moderate level of cost on car drivers, and less predictive of one that implies a very-low or high cost. We tested this in two steps, firstly, by determining whether the personal norms of respondents in seven countries better predicted acceptability of a push measure, involving higher costs, than a pull measure, involving very-low costs. Secondly, using only the push measure, we tested whether personal norms would be more predictive of acceptability of the policy when people felt more able (moderate cost) to reduce their car use than when they felt less able (high cost), indicating the level of cost implied by the policy.

In line with Hypothesis 1a and the A-B-C model, but counter to the predictions of the low-cost hypothesis, personal norms were significantly less predictive of acceptability of the pull measure – public transport improvements – a measure unlikely to pose externally difficult conditions when implemented, than of acceptability of a push measure – car-use-tax

Table 2
Moderated multiple regression results for acceptability of **Push Measure**.

		<i>b</i>	<i>t</i>	<i>R</i> ²	<i>F</i>	<i>df</i>	<i>p</i>
France	Model			0.08	28.21	3, 877	<.001
	Personal norm	0.17	3.98				<.001
	Ability to reduce	0.13	3.21				.001
	Personal norm*ability	0.00	0.03				.98
Greece	Model			0.08	21.77	3, 914	<.001
	Personal norm	0.23	5.18				<.001
	Ability to reduce	0.08	2.11				.04
	Personal norm*ability	0.01	0.46				.65
Hungary	Model			0.09	23.56	3, 852	<.001
	Personal norm	0.25	5.32				<.001
	Ability to reduce	0.09	2.46				.01
	Personal norm*ability	0.02	0.89				.37
Netherlands	Model			0.18	42.62	3, 754	<.001
	Personal norm	0.43	9.50				<.001
	Ability to reduce	−0.01	−0.35				.73
	Personal norm*ability	0.04	1.70				.09
Norway	Model			0.21	56.83	3, 839	<.001
	Personal norm	0.42	8.94				<.001
	Ability to reduce	0.10	2.61				.009
	Personal norm*ability	0.06	2.62				.009
Switzerland	Model			0.11	34.18	3, 936	<.001
	Personal norm	0.31	7.13				<.001
	Ability to reduce	0.07	1.55				.12
	Personal norm*ability	0.03	1.31				.19
UK	Model			0.08	20.65	3, 845	<.001
	Personal norm	0.21	4.84				<.001
	Ability to reduce	0.08	2.27				.02
	Personal norm*ability	0.06	3.14				.001

Table 3
Slopes (*b*) of regression lines and results of *t* tests of significance for lines shown in Fig. 2.

Country	Ability group	<i>b</i>	<i>t</i>	<i>p</i>	95% CI for <i>b</i>
France	Low	0.17	3.65	<.001	0.08, 0.26
	Medium	0.17	3.98	<.001	0.09, 0.26
	High	0.17	2.77	.01	0.05, 0.29
Greece	Low	0.21	3.66	<.001	0.10, 0.32
	Medium	0.23	5.18	<.001	0.14, 0.31
	High	0.24	4.38	<.001	0.13, 0.35
Hungary	Low	0.21	3.42	<.001	0.09, 0.34
	Medium	0.25	5.32	<.001	0.16, 0.34
	High	0.29	4.65	<.001	0.16, 0.41
Netherlands	Low	0.37	5.87	<.001	0.24, 0.49
	Medium	0.43	9.50	<.001	0.34, 0.52
	High	0.50	8.95	<.001	0.38, 0.60
Norway	Low	0.32	4.92	<.001	0.19, 0.44
	Medium	0.42	8.94	<.001	0.32, 0.51
	High	0.52	9.20	<.001	0.41, 0.63
Switzerland	Low	0.26	4.24	<.001	0.14, 0.39
	Medium	0.31	7.13	<.001	0.23, 0.40
	High	0.36	6.81	<.001	0.26, 0.47
UK	Low	0.10	1.55	.12	−0.03, 0.22
	Medium	0.21	4.84	<.001	0.12, 0.29
	High	0.32	6.40	<.001	0.22, 0.42

increase – a measure that is likely to make it more difficult to continue to drive. Personal norm was hardly predictive of the pull measure, probably because acceptability of the policy was very high (see Fig. 1). For the push measure, on the other hand, the strength of individuals' personal norms was a significant predictor of acceptability; individuals with stronger personal norms to reduce driving rated the policy as more acceptable than individuals with weaker personal norms. We replicated the result in all seven countries in the study, which supports the robustness of our finding. Our results align with those

of Eriksson et al. (2006, 2008), who found a relationship between personal norms and acceptability of a push measure but not of a pull measure to reduce car use. Our results in relation to Hypothesis 1a do not support the low-cost hypothesis which predicts a simple linear relationship between cost and personal norms such that personal norms should become better predictors of acceptability as the cost of the behavior decreases. Our result, therefore, may help to explain other findings counter to the hypothesis, such as those finding personal norms (Andersson & von Borgstede, 2010) and environmental concern (Best & Kneip, 2011) to be better predictors of high-cost than of low-cost recycling behavior. In other words, the low-cost hypothesis does not seem to hold in situations of very-low cost.

Our overall analysis supported Hypothesis 1b. Personal norms were more predictive of the acceptability of the push measure for individuals who felt more able to reduce their car use (moderate cost) than for individuals who felt less able to reduce their car use (high cost). This finding suggests that individuals are less likely to act in accordance with personal norms when external conditions are such that it is very difficult to do so compared to when it is moderately difficult. This second finding – an interaction between personal norms and ability to reduce car use – supports both the low-cost hypothesis and the A-B-C model, and suggests that the ability of personal norms to predict acceptability depends on the cost of reducing car use. Our results support the negative linear relationship predicted by the low-cost hypothesis because personal norms became a better predictor of acceptability of a push policy as the cost of the policy decreased (or as people were better able to respond to the policy by reducing their car use). For the A-B-C model, Hypothesis 1b focused on one half of the U-shaped function predicted by the model in which personal norms were expected to be a better predictor of moderate costs (a push policy where people were better able to reduce their car use) than of high costs (a push policy where people were less able to reduce their car use).

Looking at the countries separately, however, we found support for the hypothesized interaction between personal norms and ability to reduce car use only in Norway and the UK. Although the slopes of lines fitted to personal norms and mean acceptability at different levels of ability in Fig. 2 were not parallel for three of the remaining five countries, the interactions did not reach significance, despite large sample sizes. Thus, although our results supported our hypothesis overall, we found some country differences, particularly, mixed support for Hypothesis 1b. Future researchers could examine why country differences occur. In doing so, they could explore the role of different country-level predictors, such as differences in car use or ownership, and cost and availability of public transport. Ideally, future researchers would include many more countries than we did here so as to facilitate a multilevel modelling approach that could be used to test how country-level characteristics interact with personal norms, ability to reduce car use, and the interaction of these individual-level variables. Additionally, future researchers could include a range of alternative policies to further test for the proposed U-shaped function predicted by the A-B-C model.

Our findings may have implications for which factors policy makers should consider when developing policies. Pull-policy measures are already acceptable to the public irrespective of personal norms and therefore require no additional intervention to convince the public to support them. Push-policy measures, however, are likely to present greater external constraints to behavior, and therefore result in lower public acceptability. For push policies, there are two routes to increasing acceptability. First, an intervention could aim to strengthen personal norms related to the desired behavior, given that personal norms are predictive of acceptability of such policies. Second, push policies that people feel better able to respond to are more likely to be accepted; thus, it may be wise to pair push policies with pull policies that increase non-driving alternatives for car users. The interaction between personal norms and ability suggests that interventions to strengthen personal norms will increase the acceptability of push policies particularly when the ability to reduce car use is higher. Therefore, the intervention strategy that follows from our results would be to combine push measures with pull measures at the same time as attempts to strengthen personal norms to reduce car use. Future research could assess acceptability of such combined policy measures in the presence and absence of attempts to strengthen personal norms.

6. Limitations and directions for future research

Our decision to include only personal norms, ability to reduce car use, and their interaction term as antecedents of acceptability means that our regression models account for relatively modest amounts of variance in acceptability, particularly in the analysis of the data from individual countries. Although this allowed for a simple test of our hypotheses, future studies could include a greater number of potential predictor variables, such as beliefs regarding fairness and efficiency of policy measures, perceived freedom, and revenue allocation (see e.g., Cools et al., 2011; Eriksson et al., 2006, 2008; Gärling & Schuitema, 2007; Schuitema & Steg, 2008; Schuitema & Jacobsson, 2012), and including variables at the country level, such as availability of public transport, and car use and ownership rates. More comprehensive models that include such predictor variables may increase the variance accounted for over and above the levels we report here. Future researchers could also attempt to replicate our findings with other types of policies to test the generalizability of the interaction between personal norm and ability to change behavior in relation to a wider range of environmental issues.

To collect our extensive data set, we used commercial opt-in panels. Some claim that data collected using such panels may differ from data collected using traditional means of data collection (Hays, Liu, & Kapteyn, 2015; Yeager et al., 2011), stressing that opt-in panels may result in non-representative samples of participants who provide lower-quality data. However, Walter, Seibert, Goering, and O'Boyle (2018) point out that samples used in applied psychology research are rarely representative. They concluded in a recently published meta-analysis of 90 independent samples from applied psychological

research, that convenience samples, like those obtained using opt-in panels, are appropriate when researchers are seeking to understand relationships between variables, rather than to generalize point estimates, such as mean values, to a population.

In conclusion, we showed that personal norms with regard to car-use reductions are more predictive of acceptability of policy measures when those measures will result in external conditions that require behavior that is neither extremely easy nor extremely difficult. First, we found that personal norms were significantly less predictive of the acceptability of a pull measure, namely, public-transport improvements, than of a push measure, namely, car-use-tax increases. Second, we showed that personal norms were less predictive of acceptability of car-use-tax increases among individuals who felt poorly able to reduce their car use (for whom implementation of such a policy measure would be especially difficult to respond to) than among those who felt better able to do so. We have therefore provided further evidence for A-B-C model in which internal processes are only predicted to affect behavior when the external conditions do not give rise to a behavior that is extremely easy, or extremely difficult, to perform (Guagnano et al., 1995; Stern & Oskamp, 1987).

Author Contribution

Keizer wrote the first draft of the paper as part of his doctoral thesis. Sargisson took the lead next to prepare this article, with van Zomeren and Steg providing feedback.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.trf.2019.06.005>.

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