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“To support or not to support, that is the question”. Testing the VBN theory in predicting support for car use reduction policies in Russia

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ABSTRACT

High use of motorized vehicles is a major cause of CO₂ emissions, affecting the quality of the environment negatively. Employing policies that aim to reduce car use would be key to decrease transport-related emissions. However, such policies need to be accepted by the public to be successful. In the current paper, we examine whether support for car use reduction policies can be predicted by the Value-Belief-Norm theory (VBN; Stern, 2000), reflecting a process of value triggered norm-activation about reducing one's car use. Notably, we tested the VBN theory in Russia, which is a post-socialist country with a high car use and high transport-related CO₂ emissions. As expected, findings indicate that high endorsement of biospheric values is associated with high environmental concern, which is related to an increased awareness of environmental consequences of car use, and a high ascription of responsibility of one's own contribution to environmental problems related to car use. This process leads to strengthening personal norms to reduce own car use, which were associated with higher acceptability of car use reduction policies. The findings indicate that policies that aim at increased support for car use reduction in Russia could target biospheric values and activate personal norms.

1. Introduction

Transport is a major cause of CO₂ emissions, especially in developed parts of the world. Among several modes of transport, road transport is far exceeding the others in terms of resulting emissions (OECD, 2009), with car use having the largest negative impact on the environment. The increasing use of cars is a major threat to environmental quality. Besides CO₂ emissions causing global warming, fuel combustion causes air pollution particularly in big cities, and might impair individual well-being through negative effects on health. Despite such negative consequences, car use is still one of the most preferred modes of transport. Notably, switching to sustainable modes of transport is expected to decrease CO₂ and polluting emissions, meaning that car use reduction would have a significant impact on the quality of the environment and human well-being, especially in highly motorized countries. Many governments consider implementing car use reduction policies to reduce car use, as to mitigate environmental and health problems. Such policies need public support. Previous findings from research conducted in Europe and Latin America indicate that the level of support for car use reduction policies depends on a value-triggered norm-activation: people who value the environment perceive car use reduction as a moral issue, and are more willing to support car use reduction policies and to reduce their car use (see Jakovcević and Steg, 2013; De Groot et al., 2008). The question remains whether these results can be generalized to other parts of the world, such as post-socialist countries. This is an important question because post-socialist countries have particular cultural characteristics that are different from Western Europe (Schwartz, 2008; De Groot et al., 2012), which might influence the way they perceive and evaluate

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environmental problems and issues and act accordingly. In the current study, we aim at investigating factors that explain the acceptability of car use reduction policies in Russia, which is a post-socialist country with a high motorization rate (ECMT, 2006), and therefore with high CO₂ emissions resulting from transport.

Research on the main motivations behind car use and acceptability of car use reduction policies reveals that car use is associated with several perceived individual benefits, such as comfort, reduced travel time and independence (Tertoolen et al., 1998; Hiscock et al., 2002; Beirão and Sarsfield-Cabral, 2007). In addition, a private car might be seen as a status symbol, and can be used as an indication of wealth and prestige (Granskaya and Zaicev, 2017; Noppers et al., 2014; Steg, 2005). Due to such instrumental or symbolic motives behind car use, reduction of car use and support for car use reduction policies has been regarded as a pro-environmental behaviour reflecting a social dilemma, because it relies on giving up on individual benefits for the sake of environmental benefits (Nordlund and Garvill, 2003; Van Vugt et al., 1995). As such, acceptability of car use reduction policies might rely on the extent to which individuals are concerned about the quality of the environment, and hence, are willing to refrain from individual gains associated with driving in order to benefit environmental quality.

Refraining from individual gains for the collective good or just for the sake of nature itself reflects a moral choice, because it signifies “doing the right thing”. So, pro-environmental behaviours like car use reduction and support for car use reduction policies are likely to be driven by moral or normative considerations. The Value-Belief-Norm theory of environmentalism (VBN theory; Stern et al., 1999) is a model that focuses on how such moral or normative considerations can affect behaviour. The VBN theory proposes that pro-environmental behaviours result from the activation of personal norms, which are rooted in individual values. Specifically, values refer to what people find important and prioritize as guiding principles in life (Schwartz, 1992). As such, values colour cognitions, and affect attitudes, beliefs, norms, preferences and eventually behaviours (Feather, 1995; Steg et al., 2014a; Steg et al., 2014b). Then, which values have an influence on pro-environmental behaviour in particular?

Research identified self-transcendence and self-enhancement values as being particularly relevant in the environmental domain (Schwartz, 1994; Dietz et al., 2005; Steg and De Groot, 2010). Notably, while self-transcendence values guide behaviour in a direction that prioritises the welfare of others and collective benefits (including nature and the environment), self-enhancement values put emphasis on individual benefits in deciding a course of action. In line with this reasoning, Steg and colleagues (2014a, 2014b) identified egoistic, hedonic, altruistic and biospheric value orientations as being the most influential on pro-environmental behaviours, with the former two values representing self-enhancement, and the latter two representing self-transcendence. Biospheric values characterise a set of principles that reflect a key concern for the environment, while altruistic values characterise a set of principles that reflect a key concern for welfare of other human beings. Both biospheric and altruistic values have been linked to engaging in pro-environmental behaviours in several domains, including reduced car use, support for car use reduction policies, and switching to sustainable modes of transport. Not surprisingly, the two values were also found to positively correlate with each other, as they both reflect self-transcendence values. Yet, it has been empirically shown that biospheric and altruistic values refer to different constructs: when there is a conflict between the two values, individuals were found to act in line with the value type they prioritise (De Groot and Steg, 2008). Notably, research has shown that people strongly value biospheric values, and that biospheric values are most strongly and consistently related to pro-environmental behaviour in different countries in the world (see Steg and De Groot, 2012, for a review). These findings imply that it is relevant to make a distinction between the two types of self-transcendence values.

Among the self-enhancement values, hedonic values represent a set of principles reflecting a key concern for doing things for the fun of it and reducing effort. Egoistic values represent a key concern for increasing or securing personal resources. As such, people who strongly endorse egoistic or hedonic values would only act pro-environmentally when engaging in pro-environmental behaviours is not costly or effortful. Yet, most of the pro-environmental behaviours are associated with some behavioural costs or require effort. For example, reducing car use is effortful because it requires giving up the pleasure and comfort of using one's own vehicle, which may reduce public support for car use reduction policies. Hence, not surprisingly, both egoistic and hedonic values were generally found to be negatively related to pro-environmental behaviour, and to inhibit pro-environmental behaviour including in the domain of travel (Jakovcević and Steg, 2013; De Groot and Steg, 2008; De Groot et al., 2008; Thøgersen and Ölander, 2002; Stern, 2000; Stern et al., 1995; Kalof et al., 1999). Hedonic and egoistic values were found to somewhat positively correlate with each other, while still representing different constructs (see Steg et al., 2014), meaning that it is relevant to make a distinction between the two types of self-enhancement values as well.

Regardless of whether values enhance or inhibit pro-environmental behaviour, the influence of values on behaviour seems to be mostly indirect: values affect behaviour indirectly via their influence on behaviour-specific beliefs and personal norms. More specifically, the VBN theory assumes values elicit a process of norm-activation (Stern, 2000; Schwartz, 1973; see Fig. 1) that eventually affects behaviour. VBN theory suggests that personal norms, which are defined as feelings of moral obligation to act in a certain way (Schwartz, 1973), is the direct predictor of behaviour. If a person holds strong personal norms to engage in a specific pro-environmental action such as car use reduction, it is more likely that the person will find car use reduction policies acceptable. The VBN

Fig. 1. Value-Belief-Norm Theory (VBN). Adapted from Stern (2000).

theory further proposes that personal norms will be activated when one is aware of the negative consequences of his or her actions on the environment (awareness of consequences, AC) and when one feels responsible for these negative consequences of one's own actions and thinks that his/her actions can make a difference in reducing these problems (ascription of responsibility, AR). When applied to acceptability of car use reduction policies, personal norms to accept car use reduction policies would be stronger if a person is aware of the negative consequences of using a private vehicle on the environment, and if the person feels that he or she is somewhat contributing to this problem and can contribute to possible solutions for it. Finally, the VBN theory predicts that awareness of consequences depends on values and environmental concern (i.e., New Environmental Paradigm, NEP; Dunlap et al., 2000). NEP reflects ecological worldviews on the relations between human and environment, and whether one perceives humans as part of the environment or as ruling the environment. Those with an ecological worldview that humans are not the rulers of the environment but a genuine part of it just like other animals and plants, have a higher environmental concern. Importantly, values have a direct influence on environmental concern, which in turn predict awareness of consequences and ascription of responsibility (see Fig. 1). Stronger altruistic and particularly biospheric values are expected to result in higher environmental concern, which then fuels the process of norm activation, while the opposite is true for strong egoistic and hedonic values.

The causal chain proposed by the VBN theory (Stern, 2000) has been examined in relation to several types of pro-environmental intentions and behaviour, providing full or at least partial support to the theory (De Groot et al., 2008; Jakovcevic and Steg, 2013; Jansson et al., 2011; Steg et al., 2005; Scherbaum et al., 2008; Ünal, Steg & Gorsira, in press). In one particular study, De Groot and Steg (2007) tested the VBN theory in relation to acceptability of car use reduction policies in five European countries. The authors provided full support for the causal chain as proposed by the VBN theory: values indeed enhanced environmental concern, which in turn strengthened awareness of consequences and ascription of responsibility, followed by holding strong personal norms about car use reduction leading to stronger support of car use reduction policies. Importantly, a replication of their study in Argentina, which is a Latin American country, revealed similar findings: value-activated personal norms led to a higher acceptability of car use reduction policies and a higher intention to reduce car use, again supporting the VBN theory (Jakovcevic and Steg, 2013). This finding indicated that moral or normative considerations play an important role in decisions to act pro-environmentally and accept car reduction policies not only in Europe which already has a structured agenda to counter environmental problems, but also in a Latin-American country where environmental issues were only recently discussed systematically. This provides initial empirical evidence for the cross-cultural validation of the VBN theory. Yet, does this mean that the VBN theory can predict pro-environmental actions and environmental policy support in any country?

Several culture-specific aspects affect the way certain values are prioritised over other values, such as the political and economic system (Schwartz, 2009), which may have implications for the norm-activation process proposed by the VBN. One important aspect in this regard is whether a country is a post-socialist country, as post-socialist countries have historically witnessed a different political and economic structure during the exercise with the socialist regime (Schwartz and Bardi, 1997). In an attempt to explain differences between post-socialist and other countries, Schwartz and Bardi (1997) have argued that individuals who have experienced economic restraints and difficulties due to the socialist regime might start prioritising self-enhancement values like wealth more strongly, as a compensation for or reaction to the previous hardship. An investigation of most prioritized values in Russia supports their reasoning: power (an egoistic value) and hedonism were among the most preferred values among Russian people (Lebedeva, 2001), suggesting that self-enhancement values are being prioritised in Russia, which implies that these values may inhibit pro-environmental actions and would result in giving low support for environmental policies. Interestingly though, there is some initial evidence to suggest that post-socialist countries also strongly endorse self-transcendence values: biospheric values were found to be rather strongly endorsed by people in the post-socialist Hungary, and were linked to several pro-environmental behaviours including reduction of car travel (De Groot et al., 2012). In line with that, Lebedeva (2001) also reported that self-transcendence values (such as benevolence and universalism) appeared as a factor motivating behaviour as much as hedonic and egoistic values. Hence, it remains unclear which values most strongly motivate pro-environmental behaviour or via which processes values affect environmental policy support in post-socialist countries. We aim at extending this line of research by examining to what extent the VBN theory explains support for car use reduction policies in post-socialist countries.

One post-socialist country with a high number of car use and motorization is Russia. More specifically, there has been a 260% increase in motor vehicles in Russia after 1990 (ECMT, 2006). In addition, while the traffic safety impacts of high motorization (i.e., increased deaths and injuries on the road) are being discussed extensively in Russia (ECMT, 2006), discussions around environmental impact are still not that prominent. Yet, as a growing economy, Russia is among the countries with the highest amount of CO₂ emissions resulting from energy use including in the domain of transport (OECD, 2000). Hence, countries such as Russia can benefit a lot from policies aimed at decreasing the amount of CO₂ emissions, such as car use reduction policies. But would such policies be accepted in post-socialist Russia? And would the level of support for such policies be related to a value-triggered norm activation process as observed in several European countries and recently in Argentina?

To our knowledge, the VBN theory has not been tested in Russia, and more generally in post-socialist countries yet. The question remains whether people in post-socialist countries do value nature and the environment as such, and whether such biospheric values would still trigger a process of norm activation that enhances support for car use reduction policies in Russia. The current study will therefore contribute to the cross-cultural validation of the VBN theory, by extending its application to post-socialist Russia, which represents a rather different culture but increasingly faces environmental problems due to motorized transport.

To summarize, our key research question is whether values affect pro-environmental behaviours via a process of norm-activation in the post-socialist Russia, and, whether moral considerations affect pro-environmental actions, in this case support for car use reduction policies, in post-socialist countries such as Russia in a similar way as found in previous studies in Western Europe and Argentina.

2. Method

2.1. Respondents and procedure

A questionnaire study was conducted in St. Petersburg in 2010. We distributed the questionnaires among students of the intensive training program at the Psychology Department of the St. Petersburg State University open for students with different professional backgrounds and of different age groups. We asked students to fill in the questionnaire themselves, and to distribute it among family members and friends (i.e., snowball technique). By using this technique, we aimed at having a diverse sample. The questionnaire was self-administered, and there were no inclusion or exclusion criteria. Participation was on a voluntary basis, and participants could withdraw their participation anytime they wanted. In total 122 respondents (87 female, 34 male; one did not fill in gender and one did not fill in age) participated in the study. Respondents had a mean age of 28.6 years ($SD = 8.14$). The majority of the participants indicated that they own and use a car (73%) while 8.2% indicated that they own but not use a car. The remaining participants (17.2%) indicated that they do not own a car in their households¹. Among the participants, the majority indicated to have a moderate income (73.8%), 9% indicated to have a low income and approximately 15% indicated to have a high income. About 47.5% of the participants had a university degree, 41% were undergraduate students, while about 6% had a degree from a vocational school. In addition, one participant indicated to have secondary school degree and one participant indicated to have a graduate school degree.

2.2. Measures

The questionnaire included five sections. The first section consisted of the value measure while the second comprised the NEP scale. In the third section, we included items measuring awareness of consequences, ascription of responsibility and personal norms. The fourth section included items tapping on acceptability of car use reduction policies, which was our dependent variable. Finally, the last section consisted of demographics and items on current car use. Most items included in our value scale were based on Schwartz's value scale (1992), which has been validated in Russia by Karandashev (2004). The items that were not included in the original scale developed by Schwartz as well as the other items included in our study were translated from English to Russian by a bilingual student in St. Petersburg.

2.2.1. Values

We used a validated and brief value questionnaire (De Groot and Steg, 2008; Steg et al., 2014). The scale consisted of 16 items depicting four values, namely biospheric (i.e., Respecting the earth, Unity with nature, Protecting the environment, Preventing pollution), altruistic (i.e., Equality, A world at peace, Social justice, Helpful), hedonic (i.e., Pleasure, Enjoying life, Self-indulgent) and egoistic values (i.e., Social power, Wealth, Authority, Influential, Ambitious). Participants indicated the importance of these values to them as a guiding principle in life ranging from -1 (opposed to my values), 0 (not important) to 7 (of supreme importance). Hedonic values had a high internal consistency ($\alpha = 0.75$; $M = 4.38$, $SD = 1.51$) and egoistic values formed a reliable scale as well ($\alpha = 0.65$; $M = 3.25$, $SD = 1.25$). The internal consistency of altruistic values was somewhat low but acceptable ($\alpha = 0.53$; $M = 4.28$, $SD = 1.34$) while biospheric values formed a highly reliable scale ($\alpha = 0.82$; $M = 4.48$, $SD = 1.45$). Visual inspection of the mean endorsement for each value would reveal that biospheric, altruistic and hedonic values were endorsed equally high, while egoistic values were endorsed the lowest.

2.2.2. The New Environmental Paradigm (NEP) scale

The revised version of the NEP (Dunlap et al., 2000) was included which consisted of 15 items (e.g., Humans are severely abusing the environment). Participants responded by using a 5-point Likert-scale indicating to what extent they agree with the items (1 = strongly disagree, 5 = strongly agree). The scale had a high internal consistency ($\alpha = 0.76$). Therefore, we computed the mean score on these items, after recoding the negatively phrased items ($M = 3.6$, $SD = 0.51$).

2.2.3. Awareness of consequences, ascription of responsibility, and personal norms

We included 19 items tapping on awareness of consequences (AC), ascription of responsibility (AR) and personal norms (PN) related to car use (based on De Groot et al., 2008). Like in the original study, a confirmatory factor analysis indicated that these subscales could be empirically distinguished. The items were presented in mixed order. Participants indicated to what extent they agree or disagree with each item by using a 7-point Likert scale (1 = fully disagree, 7 = fully agree). Whenever appropriate, relevant items were recoded so that high scores indicated higher awareness of consequences, ascription of responsibility and personal norms.

Awareness of consequences included five items (i.e., Car use causes exhaustion of scarce resources such as oil; Car use is an important cause of traffic-related accidents; Car use takes up a lot of space resulting in less space for cyclists, pedestrians and children; Car use reduces urban quality of life due to traffic noise and odour nuisance; By reducing car use the level of air pollution will decrease). The internal consistency of the five items was somewhat low but acceptable ($\alpha = 0.52^2$). Therefore, we computed the mean score on these items ($M = 5.46$, $SD = 0.98$).

¹ As the study focuses on supporting car use reduction policies and not the actual behaviour of reducing car use, we included also those without a possession of a car in the analyses.

² Excluding items did not improve the reliability of the subscale.

Ascription of responsibility originally included six items (i.e., I feel joint responsibility for the exhaustion of fossil fuels by car use; I am jointly responsible for the problems caused by car use; Not just others, like the government, are responsible for heavy traffic, but me too; In principle, one person cannot decrease the problems of car use; I feel joint responsibility for the contribution of car traffic to global warming; My contribution to the problems of car use is negligible). Reliability analyses revealed that the item “In principle, one person cannot decrease the problems of car use” was weakly correlated with the other items in the scale, and significantly reduced the internal consistency of the scale. Therefore, we excluded this item from scale. The remaining five items formed a sufficiently reliable scale ($\alpha = 0.63$; $M = 5.15$, $SD = 1.19$).

Personal norms were measured by means of eight items (i.e., I feel personally obliged to travel in an environmentally sound way, such as by using a bicycle or public transport; I would be a better person if I used more often other transport modes instead of the car; People like me should do whatever they can to minimize their car use; I feel obliged to take the environmental consequences of car use into account when making travel choices; I don't feel guilty when I use the car even though there are other feasible transport alternatives available; If I buy a new car, I feel morally obliged to buy an energy-efficient car; I feel morally obliged to use the car as little as possible, regardless of what other people do; I don't feel personally obliged to use the car as little as possible). The scale had a high internal consistency ($\alpha = 0.83$; $M = 3.96$, $SD = 1.14$).

2.2.4. Dependent variable: Acceptability of a car use reduction policy

Our dependent variable was the acceptability of a pricing policy aimed at reducing car use. Specifically, participants read the following policy-scenario: “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”. Next, participants were asked to indicate how acceptable this policy would be if it had been implemented, by using a scale comprising of five items: 1- I would protest against it, 2- I would resign myself to it, 3- I would accept it, 4- I would feel that the policy was unfair to me, 5- I would agree with it. Responses were given on a 5-point Likert scale (1 = definitely not, 5 = certainly). We computed mean scores on the items, after recoding scores on item 1 and 4 so that high scores reflect high acceptability. The scale had a high internal consistency; $\alpha = 0.84$ ($M = 3.11$, $SD = 1.02$; $N = 115$).

2.3. Analyses

To test the VBN theory, we conducted a series of regression analyses, following the procedure by De Groot and colleagues (2008). Based on this procedure, we regressed each variable onto its most immediate preceding variable in order to observe the predictive power of the most immediate variable on the next variable (Model 1). Then, we investigated whether the inclusion of other preceding variables predict additional variance in the dependent variable (Model 2). To test whether the proposed mediation model (see Fig. 1) was significant, we carried out a serial mediation analysis by using the bootstrap method, which allowed us testing all mediation effects in the VBN model simultaneously (see Preacher and Hayes, 2004).

3. Results

3.1. Testing the VBN theory to explain acceptability of car use reduction policies

Table 1 presents the results of the series of regression analyses. Personal norms explained 11% of the variation in acceptability. As expected, stronger personal norms were associated with higher acceptability of the car use reduction policy ($\beta = 0.35$, $p < .001$). When all the other variables were entered in the regression model in the second step, 16% of the variance in acceptability was explained. Personal norms remained one of the strongest predictors of acceptability ($\beta = 0.32$, $p = .007$). Among the remaining variables further down the causal chain, biospheric values appeared as a significant predictor of acceptability. Interestingly, we found that stronger endorsement of biospheric values was associated with a lower acceptability of the car use reduction policy ($\beta = -0.24$, $p = .02$). As the bivariate correlation between the biospheric values and acceptability was non-significant, the finding pointed out a suppressor effect, and therefore the prevalence of a statistical artefact. AC, AR, NEP, egoistic, hedonic and altruistic values did not uniquely contribute to the model.

We further tested the causal relationship in the VBN, by using personal norms as the dependent variable in the regression analyses. AR explained 26% of the variance in personal norms at the first step. A high AR was associated with holding stronger personal norms towards the car use reduction policy ($\beta = 0.52$, $p < .001$). Inclusion of the other variables in the analysis in the second model resulted in an increase in explained variance. Together, the variables predicted 40% of the variance in personal norms. AR remained to be the strongest predictor at this step ($\beta = 0.38$, $p < .001$), followed by awareness of consequences, hedonic and biospheric values. More specifically, being aware of the negative consequences of car use was associated with a stronger feeling of moral obligation to reduce car use ($\beta = 0.19$, $p = .02$). In addition, a stronger endorsement of biospheric values was associated with stronger personal norms ($\beta = 0.18$, $p = .03$), while stronger endorsement of hedonic values was associated with holding weaker personal norms about car use reduction ($\beta = -0.19$, $p = .02$). NEP, egoistic and altruistic values did not contribute significantly to the model.

In the third regression analysis, in the first step, AC explained only 3% of the variance in AR. A higher awareness of the environmental consequences of car use was associated with a stronger ascription of responsibility ($\beta = 0.19$, $p = .04$). When the remaining variables in the chain were included in the analysis, the explained variance became 9%. At this step, AC no longer contributed to the model, and the only variable significantly associated with AR was the NEP ($\beta = 0.21$, $p = .03$): higher environmental

Table 1
Multiple regression analyses testing the causal relationships in the VBN theory.

	β	t	p	Adj R ²	F	df	p
DV: Acceptability							
Model 1				0.11	14.97	1,111	0.000
PN	0.35	3.87	0.000				
Model 2				0.16	3.73	8,104	0.001
PN	0.32	2.75	0.007				
AR	0.09	0.90	0.37				
AC	0.11	1.18	0.24				
NEP	−0.15	−1.52	0.13				
Hedonic	−0.07	−0.69	0.49				
Egoistic	−0.12	−1.29	0.20				
Altruistic	0.09	0.85	0.40				
Biospheric	−0.24	−2.38	0.02				
DV: PN							
Model 1				0.26	42.84	1,117	0.000
AR	0.52	6.55	0.000				
Model 2				0.40	12.39	7,111	0.000
AR	0.38	4.91	0.000				
AC	0.19	2.40	0.02				
NEP	0.06	0.73	0.47				
Hedonic	−0.19	−2.47	0.02				
Egoistic	−0.04	−0.51	0.61				
Altruistic	0.11	1.33	0.19				
Biospheric	0.18	2.18	0.03				
DV: AR							
Model 1				0.03	4.56	1,117	0.04
AC	0.19	2.14	0.04				
Model 2				0.09	2.96	6,112	0.01
AC	0.08	0.87	0.39				
NEP	0.21	2.16	0.03				
Hedonic	−0.15	−1.55	0.13				
Egoistic	−0.06	−0.62	0.54				
Altruistic	0.09	0.89	0.38				
Biospheric	0.02	0.19	0.85				
DV: AC							
Model 1				0.08	11.57	1,117	0.001
NEP	0.30	3.40	0.001				
Model 2				0.10	3.75	5,113	0.004
NEP	0.28	3.01	0.003				
Hedonic	−0.19	−2.01	0.05				
Egoistic	0.04	0.41	0.68				
Altruistic	0.16	1.63	0.11				
Biospheric	−0.15	−1.51	0.13				
DV: NEP							
Model 1				0.12	4.96	4,115	0.001
Hedonic	−0.10	−1.06	0.29				
Egoistic	−0.20	−2.21	0.03				
Altruistic	0.14	1.50	0.14				
Biospheric	0.20	2.01	0.05				

concern was related to higher scores on AR.

In the fourth regression analysis, in the first step, NEP explained 8% of the variance in AC ($\beta = 0.30, p = .001$). In the second step, with the inclusion of values, the explained variance in AC increased to 10%. At this step, NEP was still the strongest predictor of AC ($\beta = 0.28, p = .003$). Hedonic values also appeared to be a significant predictor of AC: a stronger endorsement of hedonic values was associated with a lower awareness of consequences ($\beta = -0.19, p = .05$).

Finally, values explained 12% of the variance in the NEP. The stronger one's biospheric values, the higher one's environmental concern ($\beta = 0.20, p = .05$), while stronger egoistic values were associated with a lower environmental concern ($\beta = -0.20, p = .03$). Altruistic and egoistic values did not significantly contribute to this model.

We further tested the full-mediation model, by following the procedure described by Preacher and Hayes (2004). As biospheric and egoistic values were the only two values predicting environmental concern in the first step of the VBN model, we tested full-mediation only with these two values. The analysis measuring the indirect effect of biospheric values on acceptability of car use reduction policies through NEP, AC, AR and PN revealed an unstandardized bootstrapped indirect effect of 0.002. The 95% confidence interval ranged from 0.0001 to 0.0082, and thus did not include zero. Hence, the results revealed that the tested mediated model was significant, although the indirect effect was very small. Second, we measured the indirect effect of egoistic values on

acceptability through NEP, AC, AR and PN. The analysis revealed that this mediation model was not statistically significant, as the 95% confidence interval ranged from -0.006 to 0.000 and included zero. Hence, our findings supported the mediation model for biospheric values, while the mediation model was not statistically significant for egoistic values.

4. Discussion

In the current study, we aimed at testing whether the VBN theory can be validated in Russia to explain acceptability of car use reduction policies. We tested the causal chain proposed by the VBN theory to find out whether each variable in the model is predicted by the variable preceding it, and examined whether values indeed predict support for car use reduction policies via a norm activation process as proposed by VBN theory (Stern et al., 1999).

We first tested the causal chain in the VBN theory step by step, followed by analyses testing the full-mediation tapping the process of value-triggered norm activation as outlined in the VBN theory. Findings were in the expected direction: all variables were positively associated with their immediate successor in the causal chain of the VBN theory. Notably, personal norms to reduce car use were the strongest predictor of acceptability of the car use reduction policy, meaning that a sense of moral obligation to cease driving is associated with higher support for car use reduction policies. Ascription of responsibility was the strongest predictor of personal norms, indicating that when one feels responsible from the negative effects of his or her actions related to car use on the environment, one has stronger feelings of moral obligation to reduce car use. In addition, ascription of responsibility was associated with awareness of consequences, indicating that a stronger awareness of the negative consequences of one's actions on the environment is related to a stronger sense of responsibility to reduce those actions. Interestingly, ascription of responsibility was strongly associated with environmental concern as well. Importantly, environmental concern was the strongest predictor of awareness of consequences, supporting the causal chain in the VBN theory. Finally, values were related to environmental concern: in line with our expectations and earlier research, biospheric values were positively related to environmental concern and egoistic values were negatively related to environmental concern.

In addition, we found support for the fully-mediated VBN model only for biospheric values. We found that biospheric values triggered a process of norm activation, and predicted feelings of moral obligation to reduce car use, which enhances acceptability of car use reduction policies for the sake of environmental gains. The finding replicated previous findings including Western European samples (Nordlund and Garvill, 2003; De Groot and Steg, 2007), and a Latin American sample from Argentina (Jakovcovic and Steg, 2013). Our findings are also in line with findings from a study in Hungary that tested a part of the VBN theory only (i.e., the study did not include hedonic values, environmental concern, awareness of consequences and ascription of responsibility), that revealed that biospheric values predicted personal norms regarding long distance and short-distance car use (De Groot et al., 2012). Our findings further extend the findings of De Groot and colleagues, and indicate that acceptability of car use reduction policies follows a process of value triggered norm-activation in Russia, with biospheric values being an important trigger. We found that egoistic values rather impaired the process of norm-activation to act pro-environmental by reducing one's car use. In line with previous research, endorsing egoistic values seem to reduce acceptability of car use reduction policies, suggesting that such a reduction is considered to have disadvantages for oneself (De Groot et al., 2008). Interestingly, hedonic and altruistic values were not related to a process of norm-activation to reduce car use.

The findings have several theoretical and practical implications. In terms of the theoretical implications, the results largely supported the VBN theory in Russia, with the exception of some small deviations. Notably, the VBN theory proposes that a variable is most strongly associated with the variable it precedes while it might also be directly related to other variables further down the chain (De Groot et al., 2008). Our findings were mostly in line with the VBN theory, with the exception that the relationship between awareness of consequences and ascription of responsibility seemed to be no longer statistically significant when environmental concern was included in the model as well. Similar findings have been reported by De Groot and colleagues (2008) where a variable was directly and most strongly associated with a variable further down the causal chain than its immediate successor. Future research is needed to test the VBN model further and explore how consistent these deviations are, and whether modifications in the model are needed. Our study was one of the first to test full-mediation in the VBN model, which supported an indirect (although small) mediated effect of biospheric values on acceptability of car use reduction policies via environmental concern, awareness of consequences, ascription of responsibility and personal norms, respectively. However, when we tested the full-mediation with egoistic values, the indirect effect of egoistic values on policy acceptability did not reach significance. The finding generally supports the theorised mediated model of VBN, while however, the small indirect effect implies that future research is needed to have firmer conclusions regarding the presence of a fully-mediated model.

In terms of practical implications, our findings suggest that support for car use reduction policies in Russia would potentially be higher if personal norms to reduce car use and related negative impact on the environment can be activated. Importantly, personal norms might be activated by increasing environmental concern, awareness of consequences, and ascription of responsibility. This norm-activation process seems to be positively influenced by biospheric and negatively influenced by egoistic values. As such, although our sample seemed to endorse biospheric values relatively strongly already, interventions on car use reduction in Russia might aim at further strengthening biospheric values of people (Steg, 2016). Besides, interventions might aim at helping people act on their biospheric values by addressing motivation to protect the environment (Steg, 2016). For instance, policy-makers could use arguments based on environmental benefits resulting from switching to more sustainable transport modes, which would resonate well with the biospheric values of people. As egoistic values had a negative effect on the norm-activation process, policy-makers might also aim at reducing perceived personal costs (i.e., status and power related perceived costs) associated with car use reduction in Russia.

It should be noted that part of the data was collected via the snowball technique. Although we did recruit a diverse sample, our sample is a convenience sample, so results may not be easily generalized to Russian population at large. Future studies using random-sampling methods to recruit large and representative samples in Russia are needed to further test the generalizability of the results.

To summarize, this study provides initial support for the VBN theory in Russia, demonstrating for the first time that moral and normative considerations affect support for car use reduction policies in Russia, via a similar process of norm activation as found in other countries and cultures. Our results provide initial evidence to suggest that biospheric values seem to be endorsed by people in post-socialist countries as well, and they act as a major trigger of a norm activation process towards higher acceptability of environmental policies.

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