

Acceptance of disincentives to driving and pro-environmental
transport intentions: The role of value structure, environmental beliefs
and norm activation

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Abstract

In order to facilitate pro-environmental transport mode use it is important to promote acceptance for disincentives to driving and intentions to use public transport. The present study aims to investigate values, environmental beliefs and norm activation as predictors of these psychological cognitions. In addition, we examine gender differences in the psychological constructs entered into the model. A questionnaire-based survey was carried out in a randomized representative sample of the Norwegian population ($n = 1043$). The results showed that the model was well-suited to explain acceptance of disincentives to driving and, to a lesser extent, intention to use public transport. Biospheric values were strongly related to an elevated ecological worldview, whereas egoistic values were associated with a weaker ecological worldview. The values had indirect relations to acceptance of disincentives to driving and intention to use public transport through the ecological worldview and Norm activation model (NAM) components, but altruistic values were found to be associated with ascription of responsibility. Females reported stronger biospheric and altruistic values, and weaker egoistic and hedonic values than males. Females also reported a stronger ecological worldview and more awareness of consequences and personal norms in the NAM. Policy planners may focus on values, environmental beliefs and norm activation in order to increase the acceptance of disincentives to driving. A broad approach, which accounts for additional factors such as transport availability, spatial factors and 'pull' measures, may be more suitable to promote intentions of public transportation mode use.

Key words: values; norms; public transport; gender; environmental worldview

1. Introduction

1.1. Background

The profound negative consequences of car use in densely populated areas include air and noise pollution, substantial land use and elevated accident risk (Banister 2011; Eriksson et al. 2008; Jakovcevic and Steg 2013). Several policy efforts have demonstrated effectiveness in reducing car use. In particular, ‘push’ measures/disincentives to driving, such as increased prices related to gasoline and parking, could be effective as they aim to reduce car use by making it more uncomfortable to choose this mode of transport (Eriksson et al. 2006).

However, the effectiveness of disincentives to driving is largely dependent on whether the measures are supported and accepted in the target public (Schade 2003; Viera et al. 2007).

Using a large urban population-based Norwegian sample, the present study focuses on the relative role of values and normative factors associated with acceptance of disincentives to driving and intentions to use pro-environmental public transport.

1.2. Theoretical framework

Environmental actions, such as car use reduction, require that people to some extent let go of certain individual benefits (e.g. flexible and rapid mobility) (Jakovcevic and Steg 2013). This implies that values and norms could be relevant for acceptance of disincentives to driving and intention to use public transport. A causal framework, termed the Value-Belief-Norm theory (VBN) (Stern 2000; Stern et al. 1999), has been suggested for values and normative factors related to pro-environmental cognitions and behaviour. This framework is an integration of the Value Theory (Schwartz 1992), the New Environmental Paradigm (NEP) (Dunlap et al. 2000) and the Norm Activation theory (NAM) (Schwartz 1977). Schwartz (1992) value theory proposed a universal set of broad motivational goals (values) that generate standards or criteria for individual cognitions and behaviour. Values (e.g. putting high importance to

social status) are perceived as rather stable in an individual and are assumed to influence subsequent attitudes and norms in the individual. The NEP refers to environmental attitudes/ecological worldview operationally defined by individual beliefs about human capability of influencing the balance in nature, perceived presence of limitations regarding technological development, and whether or not humans have a right to govern over the external environment (Dunlap et al. 2000; Dunlap 2008). Finally, the NAM is a model developed to predict altruistic behaviour. The model postulates that personal norm (i.e. a perceived moral obligation to conduct a behaviour) is shaped by two factors: (1) awareness of consequences, which refers to whether a particular behaviour is associated with specific consequences, and (2) perceptions of responsibility to conduct this specific behaviour (Stern et al. 1999).

As shown in Figure 1, the model consists of four basic values. People who hold strong altruistic values usually have a concern of the welfare of other humans, while people with strong biospheric values tend to focus on the welfare of the environment and nature. Hedonic values usually constitute a focus on personal gratification and satisfaction with as little effort as possible, and egoistic values represent a focus on promoting the self and individual resources (Stern et al. 1993; Steg et al. 2014). These values are in turn assumed to be associated with environmental cognitions (e.g. acceptance of disincentives to driving) indirectly through a person's ecological worldview (NEP). Ecological worldview is in turn expected to relate to a norm activation process (Schwartz 1977). Environmental personal norms are activated when the individual realizes the negative consequences of not conducting pro-environmental behaviours (Awareness of consequences) and when it perceives a personal responsibility for the consequences (Ascription of responsibility). When personal norms are

activated they are expected to be positively related to pro-environmental cognitions, such as acceptance of disincentives to driving and intention to use public transport.

1.3. Empirical review

Empirical investigations have demonstrated that the value structure, environmental beliefs and norms may be capable of predicting acceptance of various energy policies (de Groot and Steg 2010; Nilsson et al. 2004; Steg et al. 2005) and a wide-range of pro-environmental behaviours (Jansson et al. 2011; Raymond et al. 2011). Within the transport domain, Eriksson et al. (2008) tested some of the VBN components (NEP, awareness of consequences and personal norms) and found that personal norms had a direct positive relation to acceptance of disincentives to driving. Values and awareness of consequences have been found to directly predict personal norms, which in turn were associated with intention to reduce car use (Nordlund and Garvill 2003). It has further been shown that the VBN predicted acceptance of disincentives to driving and the intention to reduce car use in five different countries (de Groot and Steg 2008). The NAM components have further been reported to predict acceptance of transport push measures when accounting for transport motivation factors (e.g. a focus on flexible mobility and safety) and personality traits (Nordfjærn and Rundmo 2015). Jakovcevic and Steg (2013) demonstrated that values, environmental beliefs and norm activation were well-suited to explain acceptance of disincentives to driving and intention to reduce car use in an Argentinean context. More recently, by using the same data material as the current study we found that values and environmental beliefs were associated with personal norms and pro-environmental transport behaviour (Lind et al. 2015). However, the role of personal normative factors for pro-environmental cognitions and behaviour is not clear-cut, as Bamberg and Schmidt (2003) reported that personal norms were weakly related to both.

Although there is a growing body of transportation research that has investigated values, environmental beliefs and norm activation in relation to acceptance of disincentives to driving and pro-environmental intentions, relatively few of these studies have been conducted in large randomized population-based samples obtained from all large urban regions within a country. Some of the studies only tested a few of the relevant components in the VBN (Bamberg and Schmidt 2003; Eriksson et al. 2008; Nordfjærn and Rundmo 2015) and some studies did not include hedonic values (de Groot and Steg 2008; Nordlund and Garvill 2003). As hedonic values may facilitate a focus on effort, pleasure and discomfort it is considered crucial for outcomes that have implications for such self-enhancement values, e.g. pro-environmental cognitions (Steg et al. 2014). Further, some studies merely focused on transportation mode use (Bamberg and Schmidt 2003; Lind et al. 2015) and to the best of our knowledge no studies have incorporated both acceptance of disincentives to driving and intention to use public transport into the same model. This approach allows us to examine the relative contribution of values, environmental beliefs and norms to the explained variance in acceptance of disincentives to driving and intention to use public transport, while adjusting for all factors in the model. As such the current approach enables a comparison of whether the theoretical framework is more capable of explaining the variance in acceptance of disincentives to driving or intention to use public transport. This could also have implications for policy, as it will yield information about the validity of incorporating multi component interventions affecting values, environmental beliefs and norm activation components in initiatives intended to promote acceptance of disincentives to driving and use of pro-environmental transport.

1.4. Aims of the study

The aim of this study is to examine the capability of values, environmental beliefs and norm activation to explain acceptance of disincentives to driving and intention to use public transport in a large representative sample of the Norwegian urban population. In addition, we test gender differences in all psychological constructs included in the working model. Gender differences in values and environmental cognitions are important, because they may identify specific domains that could be targeted differently across gender in policy interventions (see also Stern et al. 1993). Research has shown that females tend to be more engaged in environmentalism than males (e.g. Lam and Cheng 2002), yet the evidence is inconsistent (Xiao and Hong 2010). The working model to be tested by structural equation modelling (SEM) is illustrated in Figure 1 along with the hypothesized structural relations between the psychological constructs.

Insert Figure 1 approximately here

2. Method

2.1. Participants and procedure

A self-administered questionnaire-based survey was conducted in 2013 using an electronic randomized procedure to select household addresses from the Norwegian population registry. Inclusion criteria were that potential respondents were aged 18 years or above and had an address in one of Norway's six largest urban regions (see Nordfjærn et al. 2014a for details). Only one person was selected in each household. Enrolment to a lottery with the possibility of winning a gift card worth about 1500 € was used as incentive for a response. The study routines were approved by the Norwegian Social Science Data Services (NSD) before the data collection was initiated. A total of 1043 persons (18%) responded to the survey; relatively low response rates are common in population-based transportation studies (e.g. Castanier et al.

2012). We have previously compared the current sample with population characteristics by gender and age in the six urban areas, which reflected few demographic differences (Nordfjærn et al. 2014b). As shown in Table 1, the deviances between the population and the current sample were small across gender for the age groups of 30-39 and 40-49 years. However, males aged 20-29 and 60-69 years were somewhat underrepresented in the sample. There were somewhat more females aged 50-59 years and fewer females aged 60-69 years in the sample than in the population. Of note, the distributions of gender, age and education in the current sample aligned well with previous transportation studies conducted in urban areas in Norway (e.g. Backer-Grøndahl et al. 2009).

Insert Table 1 approximately here

The sample included 56% females ($n = 579$) and 44% males ($n = 463$). On average the sample was 41.39 years of age ($SD = 12.10$, range = 18-74 years).

2.2. Measures

The measurement instruments were provided to the respondents by a coherent questionnaire (see Rundmo et al. 2013 for details). The value orientation components were measured by a validated instrument (see de Groot and Steg 2007). The respondents reported how important different values were to them on a scale (-1) "opposing my principles", (0) "not at all important" to (7) "extremely important". The instrument includes four items related to Biospheric values (e.g. Respecting the earth: Living in harmony with other species), four items regarding Altruistic values (e.g. Equality: equal opportunity for all), five items concerning Egoistic values (e.g. Social power: control over others, dominance) and three items related to Hedonic values (e.g. Enjoying life: appreciate food, sex, leisure time etc.).

The revised New Environmental Paradigm (NEP) scale was applied to measure ecological worldview (Dunlap 2008; Dunlap et al. 2000). The instrument consists of 13 items with different postulations about the environment (e.g. ‘When humans interfere with nature it often produces disastrous consequences’) with a 5-point scale ranging from (1) “strongly disagree” to (5) “strongly agree”.

Awareness of consequences, Ascription of Responsibility and Personal Norms were measured by instruments used in previous work (e.g. Abrahamse et al. 2009; de Groot and Steg 2008). The instruments were somewhat adjusted to be congruent with the Norwegian context. Information about the awareness of consequences component was obtained by six items (e.g. ‘Car use causes exhaustion of scarce resources, such as oil’). Five items were used to measure ascription of responsibility (e.g. ‘I feel joint responsibility for the exhaustion of fossil fuels by car use’) and five items were used to measure the personal norms component (e.g. ‘People like me should do whatever they can to minimize their car use’). The instrument included a 7-point scale ranging from (1) “totally disagree” to (7) “totally agree”.

Acceptance of disincentives to driving was measured by an 8-item instrument (Nordfjærn et al. 2014b). The instrument has been found to segment into one dimension, and includes different ‘push’ factors aimed to reduce car use (e.g. ‘increased parking fees’, ‘restrictions of private car use in the city centre’ and ‘increased prices on gasoline’). The scale records acceptance on a 7-point scale ranging from (1) “strongly unacceptable” to (7) “strongly acceptable”. Intention to use public transport was measured by a single item; “My intention to use public transport (e.g. metro, bus, train, tram) on daily travels from where I live is: (1) “very weak” to (5) “very strong” (see also Nordfjærn et al. 2014a).

2.3. Statistical analyses

Descriptive statistics were applied to describe sample characteristics and to reveal scores by gender on the psychological constructs. Independent samples *t*-test and Cohen's *d*-values were used for significance testing by gender and to provide effect sizes of gender differences, respectively. Cronbach's α was used to investigate the internal consistency of multi-indicator scales. All of these analyses were conducted in IBM® SPSS® Statistics 22.0.0.0. Further, the hypothesized model was tested with IBM® SPSS® Amos™. Structural Equation Modelling (SEM) was conducted by a two-step approach (Anderson and Gerbing 1988). First, a measurement model/Confirmatory Factor Analysis (CFA) was fitted and thereafter the model was tested with structural relations. We conducted two CFAs; the first analysis was set out to confirm the underlying factor structure of the components postulated by the VBN-theory, whereas the second model aimed to confirm the uni-dimensional structure of acceptance of disincentives to driving. For simplicity and brevity, only the structural relations are presented in the figure displaying the SEM outcome in the results section. However, all estimates of the measurement and structural model are reported in a dedicated table. We also controlled for co-variances between the predictors in the model (not displayed to facilitate interpretation). The correspondence/fit between the model and data was investigated by using fit indices, i.e. the Comparative Fit Index (CFI) with 90% Confidence Interval (CI 90%) and Root Means Square Error of Approximation (RMSEA).

3. Results

3.1. Dimensionality of the measurement instruments

A CFA aimed at confirming the underlying factor structure of the VBN showed that the initial model had improvement potential [$\chi^2 = 2722.26$, $df = 751$, $p < .001$, CFI = .87. RMSEA = .050 (CI 90% = .048; .052)]. By examinations of the factor loadings, it was identified that four items in the NEP scale had weak loadings below .40. The identified items were: 'We are approaching the limit of the number of people the Earth can support', 'Humans are seriously abusing the environment', 'The Earth has plenty of natural resources if we just learn how to develop them', and 'Plants and animals have as much right as humans to exist'. After removal of these items, the model reflected close fit to the data [$\chi^2 = 2107.83$, $df = 601$, $p < .001$, CFI = .90, RMSEA = .049 (CI 90% = .047; .051)] and the identified factor structure was considered satisfactory for further analysis.

Another CFA was conducted to confirm the uni-dimensional structure of acceptance for disincentives to driving. This model reflected good correspondence between the model and the data [$\chi^2 = 1193.25$, $df = 20$, $p < .001$, CFI = .92, RMSEA = .068 (CI 90% = 0.65; 0.74)].

3.2. Descriptive statistics and reliability of the factors

Means, standard deviations and reliability indices for the psychological constructs are shown by gender in Table 2. As reflected, all factors had feasible internal consistency. Females reported stronger altruistic and biospheric values than males. Females also reported stronger personal norms regarding environmental behaviour, a stronger ecological worldview as well as a stronger intention to use public transport than males. Males, on the other hand, reported stronger ascription of responsibility as well as more egoistic and slightly stronger hedonic values than females. The acceptance of disincentives to driving was overall low, and no significant gender difference was detected in this construct.

Insert Table 2 approximately here

3.3. Structural equation modelling testing values, environmental beliefs and norm activation as predictors of acceptance of disincentives to driving and intention to use public transport

The fit indices suggested that the hypothesized structural model had unsatisfactory fit to the data [$\chi^2 = 2876.57$, $df = 689$, $p < .001$, CFI = .85, RMSEA = .055 (CI 90% = .053; .057)]. However, a theoretical meaningful model improvement was detected by adding a direct path from altruism to ascription of responsibility. Several previous studies have also noted potential associations between values and the ascription of responsibility component in the NAM (e.g. de Groot and Steg 2008; Lind et al. 2015). The path between altruism and the NEP was also removed due to collinearity with biospheric values. The slightly modified theoretical model is reported in Figure 2 and had good fit to the data [$\chi^2 = 2560.72$, $df = 688$, $p < .001$, CFI = .92, RMSEA = .051 (CI 90% = .049; .053)]. All estimates of the structural model and measurement model are displayed in Table 3 in full detail.

Biospheric values were the strongest predictor of an elevated ecological worldview, whereas egoistic values were the strongest negative predictor of a weaker pro-environmental ecological worldview. Altruistic values were associated with an increased ascription of responsibility. Biospheric, hedonic and egoistic values explained a total of 43% of the variance in ecological worldview. As expected, ecological worldview predicted awareness of consequences and explained 38% of the variance in this construct. Awareness of consequences predicted ascription of responsibility with an explained variance of 28%. Ascription of responsibility did in turn predict personal norms (explained variance = 61%). Personal norms were a stronger predictor ($\beta = .61$) and explained more variance (38%) in acceptance of disincentives to driving than in intentions to use public transport ($\beta = .37$,

explained variance = 14%).

Insert Figure 2 approximately here

Insert Table 3 approximately here

4. Discussion

The current study supported previous studies (e.g., de Groot and Steg 2008; Lind et al. 2015) and showed that a model including values, environmental beliefs and norm activation was rather well-suited to explain acceptance of disincentives to driving and, to a somewhat lesser extent, intention to use public transport. Biospheric values were strongly associated with a pro-environmental ecological worldview, whereas egoistic values were linked to a less pro-environmental ecological worldview. The values overall had indirect relations to acceptance of disincentives to driving and intention to use public transport through the ecological worldview component, but altruistic values were found to be associated with ascription of responsibility. The NAM components were associated with personal norms, which in turn were associated with increased acceptance of disincentives to driving and intention to use public transport in line with theoretical assumptions.

To our knowledge the present study is the first to test the relative role of values, environmental beliefs and norm activation both for acceptance of disincentives to driving and intention to use public transport within one coherent model. The fact that the included components were more capable of explaining acceptance of disincentives to driving than

intentions to use public transport may be due to that intentions to use public transport is subject to the influence of a variety of other contextual variables. These may include availability of such transport, costs and travel distances. This is in line with Collins and Chambers (2005) who reported that biospheric and altruistic values were not related to transport behaviour when mode availability and costs were adjusted for. The current findings need extensive replication, but it is possible that values, environmental beliefs and norm activation are more suitable for predicting cognitions about push measures, while a broader framework accounting for situational and contextual constraints and possibilities, including 'pull' measures (i.e. efforts to make pro-environmental alternatives to a car more attractive to use), is more feasible when the aim is to explain pro-environmental behavioural transport intentions.

The present study revealed a potential collinearity issue between biospheric and altruistic values in the VBN framework. The potential collinearity between these two values has also been noted and discussed in previous work (de Groot and Steg 2008). The correlation coefficient in that study was .48, whereas in the present study this correlation was rather high at .62. Although de Groot and Steg (2008) argued that biospheric and altruistic values are different constructs, this assumption may need to be revisited as it is possible that they are part of one coherent construct.

Previous work reported that hedonic values are important predictors of a weaker ecological worldview (Steg et al. 2014), but this assumption was not supported in the current study. We found that altruistic values were an important predictor of ascription of responsibility in the NAM-component, whereas biospheric values were a strong predictor of promoted ecological worldview, while egoistic values were related to a weaker ecological worldview. Egoistic

values are likely to facilitate resistance in giving up personal freedom and resources in order to promote the environment. As such, it is not surprising that this factor was related to a less pro-environmental ecological worldview. Further, previous work supported the assumption that biospheric values are more important than altruistic values for ecological worldview (e.g. Steg et al. 2005). A possible explanation is that the items in the biospheric measure are more specifically related to environmental protection, while the items in the altruistic measure are more related to social justice and promotion of the welfare of others. The theoretical amendment made to the model implies that altruistic values are related to tendencies of taking responsibility for one's own environmental actions (i.e. ascription of responsibility) with potential benefits for the collective. Associations between values and ascription of responsibility have also been reported in previous work (e.g. de Groot and Steg 2008). The awareness of the negative consequences of car use on the environment is rather strong in Norway, partly due to extensive media debate. This could be a potential reason for why altruistic values may be related to ascription of responsibility in this setting, without mediation through ecological worldview and awareness of consequences.

The gender differences found in the model constructs warrant discussion. Females reported stronger biospheric and altruistic values, and weaker egoistic and hedonic values than males. Females further reported a stronger ecological worldview and more awareness of consequences and personal norms in the NAM components. An exception from this pattern was that males reported a stronger ascription of responsibility than females, which is likely related to the fact that males tend to use the car more frequently than females (Matthies et al. 2002). Policy recommendations for promotion of environmental values and norms generally tend to be tailored to both genders. The current results suggest that males could be more strongly focused, at least in regard of certain components, in programmes aimed to facilitate

pro-environmental behaviour. For instance, due to the stronger egoistic and hedonic values among males interventions may focus on transport factors which align with such values, for example lower costs, higher convenience and comfort on public transport.. On the other hand, policy actions targeted to raise the acceptability of disincentives to driving could focus on both genders, at least in the Norwegian context. The acceptance of these disincentives was overall rather low and gender differences failed to reach significance.

The present study has some limitations which should be considered when the results are interpreted. The response rate was low, but comparisons with the urban target population reflected few differences in demographic characteristics. Limitations regarding self-reported data and a cross-sectional design are common in transportation surveys and also apply to the present study. The current study focused on how values, environmental beliefs and norm activation related to acceptance of disincentives to driving. Future studies could expand the focus to the VBN in relation to acceptance or perceived effectiveness of incentives for not driving (e.g. pull efforts such as enhanced quality of public transport). Intuitively, one could assume that perceived effectiveness of pull measures are positively associated with pro-environmental cognitions. However, studies have suggested that personal norms may be more strongly associated with cognitions regarding push factors (Eriksson et al. 2008). This could partly be attributed to that personal norms could be more strongly related with interventions implying some type of personal sacrifice (see also Eriksson et al. 2006).

4.1. Conclusion

The current study aligned with previous work which suggested that values, environmental beliefs and norm activation may be suitable in explaining acceptance of disincentives to driving, and to a lower extent intention to use public transport. It is argued that policy

developers may target the VBN components in order to increase the acceptance of disincentives to driving in the Norwegian public. This could be implemented by carefully designed information strategies aimed at enhancing awareness of environmental problems and the environmental consequences that car use has on the environment among car users (Steg and Vlek 2009). Information campaigns could also aim to communicate that individual mode choice has potential collective consequences and as such reflects a normative choice rather than merely being influenced by individual needs, possibilities and constraints. These efforts could be combined with contextual interventions aimed at reducing situational constraints, such as making public transport more available and reliable.

A broad approach accounting for transport availability, spatial factors and ‘pull’ measures may be needed in order to promote intentions of using public transportation. Since males seem to have stronger egoistic and hedonistic values than females, this may be met by implementing factors such as lower costs and increased comfort and convenience on public transport. Meanwhile, there seems to be substantial improvement potentials in acceptance of disincentives to driving among both genders. A further discussion is needed regarding the inclusion of the potentially overlapping altruistic and biospheric values in the VBN framework.

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Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Authors' contribution

T Nordfjærn: Content planning, Statistical analyses, Manuscript writing

T Rundmo: Content planning, Manuscript writing and Editing

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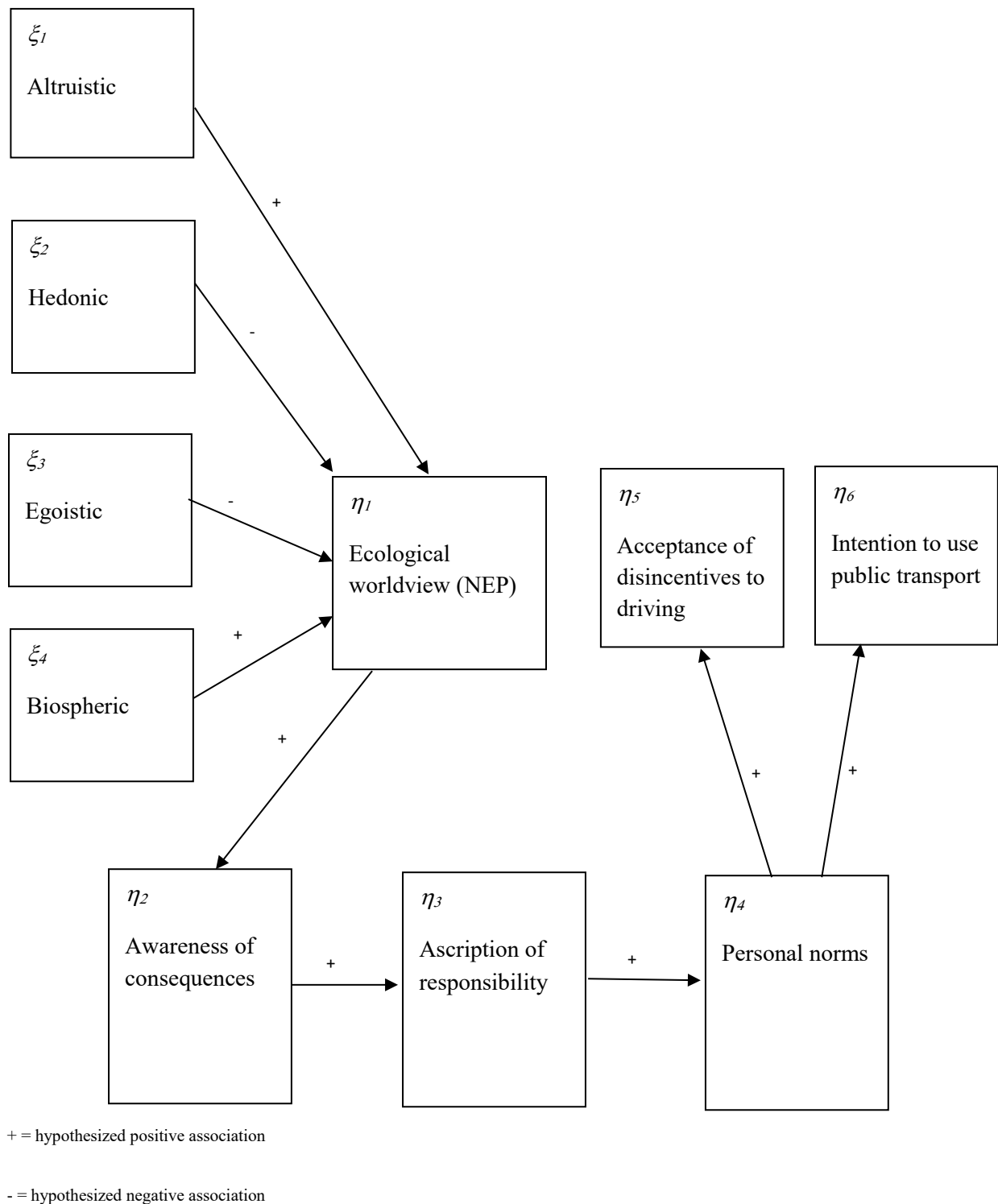
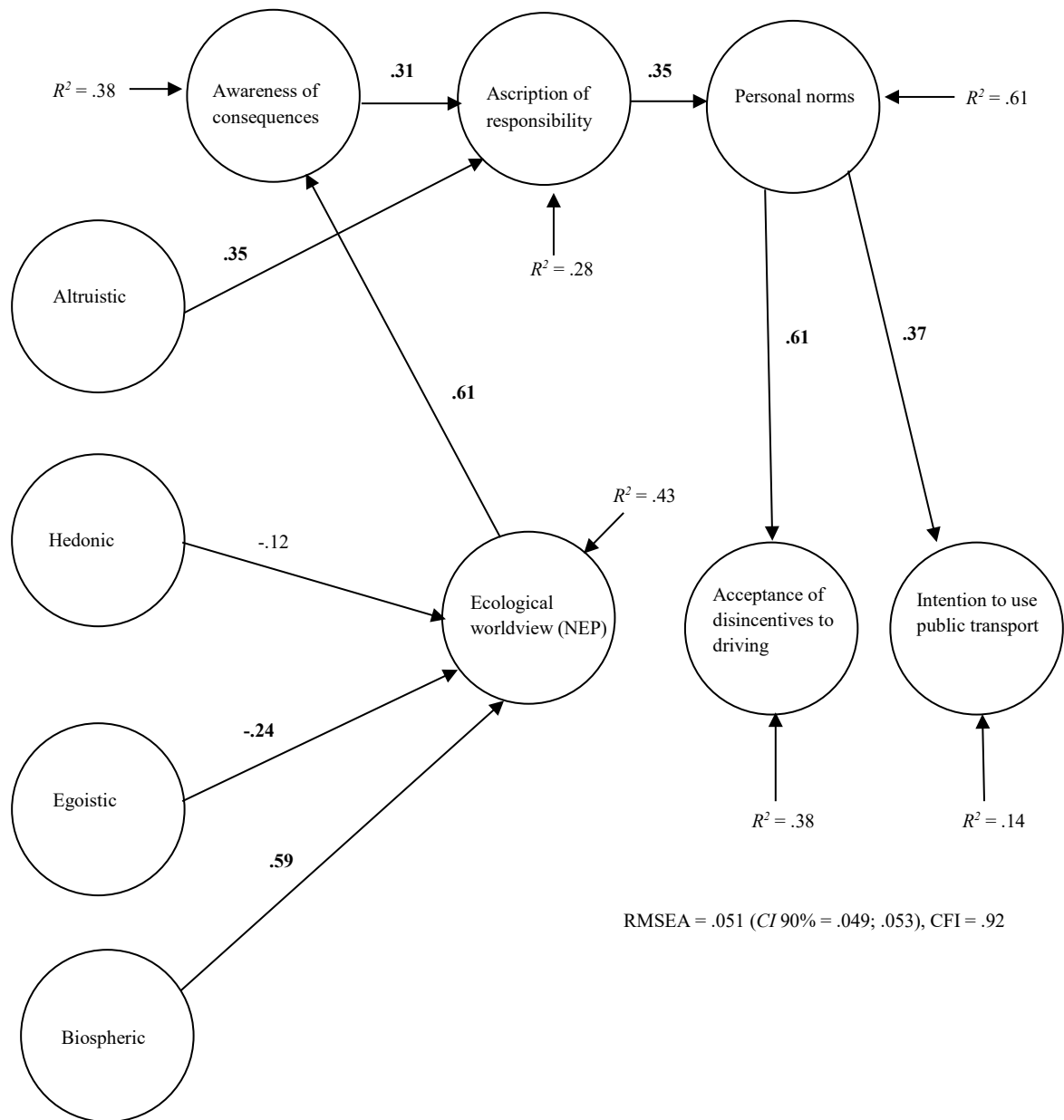


Figure 1. Working model of the study



Significant ($p < .001$) standardized path coefficients in bold

Figure 2. SEM-analysis predicting acceptance of disincentives to driving and intention to use public transport

Table 1. Characteristics of the population and sample by gender and age

Gender	Age in years	Number of persons in the population	Number of persons in the sample
		(% of total)	(% of total)
Male	18-19	-	7 (0.68)
	20-29	134 384 (11.70)	84 (8.16)
	30-39	141 662 (12.40)	105 (10.20)
	40-49	126 669 (11.10)	121 (11.75)
	50-59	101 111 (8.80)	107 (10.39)
	60-69 ¹	78 771 (6.90)	32 (3.10)
Female	18-19	-	12 (1.16)
	20-29	134 691 (11.80)	105 (10.20)
	30-39	130 374 (11.40)	138 (13.41)
	40-49	118 717 (10.40)	138 (13.41)
	50-59	97 632 (8.50)	155 (15.12)
	60-69 ¹	80 349 (7.00)	25 (2.42)
Total: males + females		1 144 360 (100)	1029 (100)

- Unavailable in population figures

¹ 60-69 years in the population and 60-74 years in the sample

Table 2. Means and standard deviations of the psychological constructs by gender

Indicator	Cronbach's α	Males Mean (<i>SD</i>)	Females Mean (<i>SD</i>)	<i>t</i>	<i>d</i>
Personal norms	.823	3.82 (1.27)	4.23 (1.18)	5.41***	-.77
Awareness of consequences	.794	4.69 (1.24)	4.83 (1.13)	1.95	-.11
Ascription of responsibility	.716	3.20 (1.38)	2.54 (1.17)	-8.32***	.52
Ecological worldview (NEP)	.791	3.45 (.54)	3.60 (.50)	4.61***	-.29
Egoistic values	.721	2.40 (1.46)	2.03 (1.32)	-4.33***	.27
Altruistic values	.752	4.79 (1.46)	5.28 (1.30)	5.70***	-.35
Biospheric values	.874	4.39 (1.53)	4.68 (1.49)	3.02**	-.19
Hedonic values	.731	4.41 (1.40)	4.18 (1.34)	-2.70*	.17
Acceptance of disincentives to driving	.892	2.89 (1.40)	2.96 (1.40)	.82	-.05
Intention to use public transport	-	2.87 (1.26)	3.26 (1.22)	5.10***	-.31

*** $p < .001$, ** $p < .005$, * $p < .01$

Table 3. Standardized estimates of the structural model and measurement model

Endogenous variable	Exogenous variable	Estimate	<i>S.E.</i>	<i>C.R.</i>	<i>p</i>
Ecological worldview (NEP)	<--- Egoistic values	-.24	.01	-6.23	***
Ecological worldview (NEP)	<--- Hedonic values	-.12	.01	-3.04	n.s.
Ecological worldview (NEP)	<--- Biospheric values	.59	.02	11.35	***
Awareness of consequences	<--- Ecological worldview (NEP)	.61	.15	9.91	***
Ascription of responsibility	<--- Awareness of consequences	.31	.04	10.65	***
Altruistic values	<--- Ascription of responsibility	.35	.02	9.41	***
Personal norms	<--- Ascription of responsibility	.35	.08	13.68	***
Acceptance of disincentives to driving	<--- Personal norms	.61	.06	15.05	***
Intention to use public transport	<--- Personal norms	.37	.04	10.61	***
Social power: control over others, dominance	<--- Egoistic values	1.00	-	-	-
Authority: the right to lead or command	<--- Egoistic values	.88	.10	15.24	***
Influential: having an impact on people and events	<--- Egoistic values	.54	.06	14.51	***
Preventing pollution: protecting natural resources	<--- Biospheric values	1.00	-	-	-
Respecting the earth: harmony with other species	<--- Biospheric values	.79	.04	26.44	***
Unity with nature: fitting into nature	<--- Biospheric values	.77	.05	25.84	***
Protecting the environment: preserving nature	<--- Biospheric values	.86	.04	29.27	***
Gratification: satisfying desires	<--- Hedonic values	1.00	-	-	-
Enjoying life: appreciate food, sex, leisure time etc.	<--- Hedonic values	.78	.05	18.94	***
Comfort: to be comfortable and well	<--- Hedonic values	.66	.04	17.99	***
Helpfulness: to work for the welfare of others	<--- Altruistic values	1.00	-	-	-
Social justice: to work against injustice and care for the weak ones	<--- Altruistic values	.81	.04	24.84	***

Endogenous variable		Exogenous variable	Estimate	<i>S.E.</i>	<i>C.R.</i>	<i>p</i>
Equality: equal opportunities for all	<---	Altruistic values	.67	.04	20.51	***
Peace in the world: a world without war and conflict	<---	Altruistic values	.66	.04	20.16	***
When humans interfere with nature it often produces disastrous consequences	<---	Ecological worldview (NEP)	1.00	-	-	-
The balance of nature is very delicate and easily upset	<---	Ecological worldview (NEP)	.51	.11	11.20	***
If things continue on their present course, we will soon experience a major ecological catastrophe	<---	Ecological worldview (NEP)	.59	.12	12.02	***
Humans have the right to modify the natural environment to suit their needs	<---	Ecological worldview (NEP)	.53	.13	11.38	***
Human ingenuity will insure that we do not make the Earth unlivable	<---	Ecological worldview (NEP)	.41	.10	9.69	***
The balance of nature is strong enough to cope with the impacts of modern industrial nations	<---	Ecological worldview (NEP)	.68	.12	12.84	***
The so-called “ecological crisis” facing humankind has been greatly exaggerated	<---	Ecological worldview (NEP)	.64	.14	12.53	***
Humans were meant to rule over the rest of nature	<---	Ecological worldview (NEP)	.49	.13	10.92	***
Humans will eventually learn enough about how nature works to be able to control it	<---	Ecological worldview (NEP)	.41	.11	9.63	***
Car use causes exhaustion of scarce resources, such as oil	<---	Awareness of consequences	1.00	-	-	-
Car use takes up a lot of space resulting in less space for cyclists...	<---	Awareness of consequences	.71	.09	15.39	***
Car use is an important cause of traffic-related accidents	<---	Awareness of consequences	.66	.07	14.79	***
Car use reduces urban quality of life due to traffic noise...	<---	Awareness of consequences	.73	.08	15.62	***
By reducing car use the level of air pollution will decrease	<---	Awareness of consequences	.64	.07	14.57	***
To protect the environment is not my responsibility	<---	Ascription of responsibility	1.00	-	-	-
My behaviour is insignificant in the grand scheme of things	<---	Ascription of responsibility	.69	.10	16.50	***
My contribution to the local air pollution is negligible	<---	Ascription of responsibility	.59	.10	14.83	***

Endogenous variable		Exogenous variable	Estimate	S.E.	C.R.	p
I use my own car as I want no matter what other people think	<---	Personal norms	1.00	-	-	-
I do not feel guilty when I choose the car, despite that there are other transportation modes available	<---	Personal norms	.54	.05	14.80	***
I feel morally obliged to use transportation modes that do not increase the load on the road traffic system	<---	Personal norms	.72	.06	18.59	***
People like me should do whatever they can to minimize their car use	<---	Personal norms	.69	.05	17.98	***
I would feel like a better person if I more often used other transport modes than the car	<---	Personal norms	.65	.06	17.14	***
I feel morally obliged to choose transport modes that do not harm the environment, such as bicycle or public transport	<---	Personal norms	.74	.06	18.92	***
Increased prices on gasoline	<---	Acceptance of disincentives...	1.00	-	-	-
Increased road tolls	<---	Acceptance of disincentives...	.88	.03	39.52	***
Restrictions of private car use in the city centre	<---	Acceptance of disincentives...	.67	.03	24.86	***
Car use prohibition in the city centre	<---	Acceptance of disincentives...	.55	.03	19.09	***
Less road development	<---	Acceptance of disincentives...	.54	.03	18.87	***
Less road maintenance	<---	Acceptance of disincentives...	.42	.03	13.12	***
Increased environmental fees	<---	Acceptance of disincentives...	.86	.03	37.13	***
Increased parking fees	<---	Acceptance of disincentives...	.81	.03	33.52	***

*** $p < .001$, n.s. = non-significant

- = constrained to 1.00