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Supporting NBS restoration measures: A test of VBN theory in the Bragues catchment

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Abstract

This paper attempts to analyse the influence of socio-psychological factors in building public support for Nature Based Solutions (NBS). From this perspective, we ask how Values, Beliefs and Norms (VBN) link to the preference of NBS in order to mitigate flood risks in the Bragues catchment area of France. Based on an original survey, we find that individuals with strong personal norms and beliefs related to altruistic concerns and the ascription of responsibility show a high preference for NBS strategies. In terms of policy implications, these results suggest the importance of encouraging public responsibility towards nature and promoting altruistic concerns by reinforcing a sense of territorial belonging.

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1. Introduction

In less than a decade, the concept of Nature Based Solutions (NBS) has become part of the policy agenda to build resilience and a sustainability environment (Nesshöver et al., 2017). The European Commision defines NBS as "actions inspired by, supported by or copied from nature… [with the] aim to achieve desired outcomes, such as reduced disaster risk and an environment that improves human well-being and socially inclusive green growth" (Nesshöver et al., 2017 p.1217). NBS is qualified as an "umbrella concept" because it integrates several ecosytem-based concepts, such as green infrastructures, catchment systems engineering, and natural systems agriculture (Eggermont et al., 2015; Nesshöver et al., 2017). Arfaoui and Gnonlonfin (2020) identify three important characteristics in the definition of NBS: the mitigation of a targeted risk, using nature, and involving stakeholders. In particular, the involvement of stakeholders in the entire process of NBS (from design to management) is essential in order to bring 'substantive', 'instrumental' and 'normative' benefits (Nesshöver et al., 2017 p.1221). Moreover, Andersson et al. (2017) stress that people's perceptions are a determinant of the survival of NBS over time because public support is essential for implementing climate policies (Drews and Bergh, 2015).

The empirical literature shows that socio-psychological factors—in particular, values, beliefs and norms—matter in understanding environmental policy preferences (Drews et al., 2015). Several theories in social psychology have attempted to explain the role of these drivers (Stern et al., 1999; Steg et al., 2005). Value-based theories (e.g., Stern et al., 1995) assume that values guide action to support environmental protection, while the Moral Norm Activation theory (e.g. Schwartz, 1977) focuses on personal norms to analyse the human–environment relationship. The New Environmental Paradigm (NEP) (e.g., Dunlap & Van-Liere, 1978) represents another widely-used theory linking worldviews; that is, general beliefs to environmental behaviour. The VBN (Values, Beliefs and Norms) theory developed by Stern et al., (1999) is an integrated framework that analyses a complex interplay of forces by combining values, general environmental beliefs and personal norms in a causal chain. This theory suggests that individuals have different value orientations, which create stable principles grounding their beliefs, and thus, representing worldviews. These beliefs activate personal norms by indicating how individuals should behave when their preferences are in conflict. According to Stern (2000), three types of values—namely egoistic, altruistic and biospheric—affect ecological worldviews, which guide pro-environmental behaviour through the Awareness of Consequences (AC) of the behaviour on the environment and feelings of responsibility (Ascription of Responsibility or AR). In turn, these worldviews create a moral obligation to take corrective action (Personal Norms, PN). The author postulates that strong biospheric and altruistic values positively affect ecological worldviews, while strong egoistic values have a negative influence. Moreover, he assumes that values may also directly influence the other factors further down the chain (AC, AR, PN, or behaviour).

VBN theory is gaining interest in the empirical literature as a means to understand the public support of environmental policy in various domains. For example, it has been successfully used in the domain of energy (e.g., Steg et al. 2005) and transport (e.g., Hiratsuka et al., 2018; Ünal et al., 2019). In environmental conservation, López-Mosquera & Sánchez (2012) show that a strong orientation towards biospheric and altruistic values, with strong normative beliefs, determine the willingness to pay for park conservation in Spain. Gao et al., (2018) emphasis the role of awareness and sense of personal responsibility in the individual's perceptions of the implementation of urban storm water management practices in Indiana (U.S.). Likewise, Josephs and Humphries (2018) analyse the influence of personal values and public understanding of a restoration project in social success of nature-based coastal management in

Massachusetts (U.S.). However, the VBN framework has not yet been employed to analyse public support to policies in the domain of the natural disaster of flood risks. According to Stern (2000), the role of socio-psychological factors depends on the importance of the environmental impact of the behaviour. Restoring river systems to mitigate flood risks in urban areas can require land use to change, resulting in significant economic and social costs. In this context, one can question the influence of socio-psychological factors in building the public acceptability of NBS.

In this paper, we try to fill this gap by addressing the question of how values, beliefs and norms are linked to the preference of NBS to mitigate flood risks. For this purpose, we analyse planned strategies to mitigate flood risks in the Brague catchment area, located in the south of France. Indeed, climate change increases the intensity and frequency of heavy rains; the so-called "Mediterranean episodes" that cause floods with serious consequences. For instance, in the department of Alpes Maritimes, the episode of October 2015 caused insured damages estimated at 500-600 million euros, with a death toll of more than 20 (Prefecture des Alpes-Maritimes, 2016). The episodes of November 2019 once again demonstrated the vulnerability of these territories to flooding. Hence, these consequences of climate change stress the need to implement an ecological restoration of river ecosystems as an alternative to civil engineering solutions.

The paper is organized as follows: Section 2 describes the empirical data and methodology, Section 3 presents the results and Section 4 concludes the study

2. Survey and Methodology

We conducted a unique survey to analyse the strengths of values, beliefs and norms in predicting the preference for NBS strategies in the Brague catchment area. This catchment area covers approximately 70 km² and has rural areas in the headwaters, a forested area in the uplands (in the centre), and urbanized areas in the lowlands. It includes 11 municipalities, encompassing around 60,000 people. A face-to-face survey was conducted from September 6 to October 15, 2019, with a representative sample of 405 people. Respondents were recruited using a random sampling procedure in public places in the 11 municipalities. Sampling weights are used to ensure that the sample is representative with respect to the area of residence, gender and age, where 52% respondents are female; 27%, 19% and 55% of respondents live in the municipality located, respectively, in the lowlands, uplands in the centre and the headwaters. The socio-economic profile of the 'average' respondent is an individual aged 50 years old, living in a household of three and earning around 1,900 euros per month.

The survey measures six items from Schwartz's (1992) universal values scale, which reflects two egoistic values (wealth and influential), two altruistic values (social justice and helpful) and two biospheric values (preventing pollution, respecting the earth and unity with nature). Respondents were asked to range these items with an eight-point scale, ranging from -1 "opposed to the value"; 0 "not at all important" to 7 "of supreme importance". Regarding the beliefs and norms, respondents answered with a five-point Likert-scale, indicating to what extent they agree with the items (-2 "strongly disagree", 2 "strongly agree"). Following Raymond & Kenter (2016), we use general attitudes of environmental concerns instead of the NEP scale. This consists of six items, of which two are egoistic concerns (my health and my prosperity), two are altruistic concerns (people in the community and future generations) and two are biospheric concerns (plants and animals). Each item is preceded by the statement: "I am concerned about environmental problems because…"

Last, respondents answered nine questions or statements related to the river restoration to indicate their Awareness of Consequences (AC), Ascription of Responsibility (AR) and Personal Norm (PN). Cronbach alpha scores suggest a very high consistency for the biospheric

values and concerns (α=0.86, M=5.15, SD=1.28 ; α=0.90, M=1.51,SD=0.59) and AR (α=0.86, M=0.44, SD=0.95); high consistency for PN (α=0.7, M=0.80, SD=0.78); adequate consistency for egoistic and altruist values (α=0.60, M=3.60, SD=1.59); α=0.64, M=4.66, SD=1.28) and egoistic concerns (α=0.64, M=0.84, SD=0.87); inadequate consistency for AC (α=0.56, M=0.76, SD=0.71) and altruist concerns (α=0.28, M=0.70, SD=0.93). Moreover, following Steg et al., (2005), we compute a corrected correlation using the multiple group method, in order to test the factor structure of the three values and concerns defined in the theoretical grounds. Appendices 1 and 2 provide empirical support to all constructs, except for the altruism concern. Because of the high level of correlation between the item of "future generations" and biospheric concerns, we include this item—theoretically related to altruist concerns—in biospheric concerns.

Our dependent variable represents the preference for NBS strategies; an alternative to grey strategies. They are based on stakeholders' knowledge and use ecosystem functions. The design of strategies has relied on a participative approach that includes local knowledge via six focus groups and 15 semi-structured interviews, between July 2017 and December 2018, with public actors and associative representatives. The survey describes two levels of ambition of the grey (grey 1 and grey 2) and NBS (NBS 1 and NBS 2) strategies in order to mitigate flood risks in the Brague catchment area, with their impacts in terms of land use change and economic costs. The grey strategies consist of civil engineering works, while NBS strategies combine different natural water retention measures.[1] Respondents were asked to choose their preferred strategy and level of ambition. We code the more (less) ambitious strategies -2 and 2 (-1 and 1), respectively, for the grey and NBS. When the preferred strategy combines the same level of ambition of the two, we code the strategy 0. Therefore, this variable was not subject to any internal validity assessment. Results from the survey show that 44% of respondents prefer the NBS 1; 10% the NBS 2; 28% the grey 1; and 18% combine the NBS 2 and grey 2. None prefer the grey 2. We follow the established procedure in earlier studies in testing the VBN theory (Steg et al., 2005; Raymond & Kenter 2016). We use two models to regress each variable in the causal chain onto the independent variables. Model 1 considers only the independent variable directly preceding the dependent variable, while Model 2 integrates all preceding variables in the causal chain. Moreover, we investigate the serial mediation relationship between the values and preference of strategies by performing a structural equation modelling based on the bootstrap method. This allows the testing of all mediation effects in the VBN chain, and we confirm the full-mediation hypothesis when the indirect and total effects are significant (Preacher and Hayes, 2004).

3. Results

Table 1 confirms the causal chain of VBN theory. First, we found that the predictive power of PN represents 5% of the variance of the preference of strategies. The more individuals feel a moral obligation to protect or restore nature, the more they prefer NBS strategies ($\beta = 0.26$, $p = 0.00$). When all of the variables in the causal chain were considered, the predictive power increase to 7% of the variance and PN, AR, AC, altruistic concerns and egoistic values has a significant effect. These results are comparable to studies in environmental public support in various fields and different countries: the restoration of ecosystem in private land in South Australia (Raymond and Kenter, 2016), transport policies in Russia and Japan (Unal et al., 2019; Hiratsuka et al., 2018) and the conservation of a suburban park in Spain (López-Mosquera and Sánchez, 2012).

[1] http://nwrm.eu/measures-catalogue

Interestingly, we found that the higher approval of egoistic values (β = -0.05, p = 0.10) and awareness of the consequences (β = -0.17, p = 0.03) of river restoration were associated with a lower preference of NBS strategies. As highlighted in the theory, environmental values affect environmental concerns, which in turn drive an individual's awareness of consequences. These latest beliefs influence the ascription of responsibility, which in turn guides an individual's personal norms to act in order to protect or restore nature. In Model 1, considering only the preceding variable, AR explains 29% of the variance in PN; AC explains 5% of the variance in AR; environmental concerns explain 22% of the variance in AC; and environmental values explain 13%, 5% and 19% of the variance in egoistic, altruistic and biospheric concerns, respectively.

Table 1: Multiple regression analyses to test the causal chain of VBN theory

	β	t	p	R^2 (Adj.)	F	p
DV: Preference of NBS strategies						
Model 1				0.04	17.76	0.00
PN	0.26	4.21	0.00			
Model 2				0.07	4.49	0.00
PN	0.15	1.85	0.06			
AR	0.17	2.73	0.01			
AC	-0.17	-2.18	0.03			
Egoistic concerns	-0.04	-0.65	0.51			
Altruistic concerns	0.11	1.96	0.05			
Biospheric concerns	0.04	0.41	0.68			
Egoistic values	-0.05	-1.64	0.10			
Altruistic values	0.01	0.35	0.72			
Biospheric values	0.01	0.23	0.81			
DV: PN						
Model 1				0.29	162.38	0.00
AR	0.44	12.74	0.00			
Model 2				0.42	37.61	0.00
AR	0.31	8.84	0.00			
AC	0.15	3.13	0.00			
Egoistic concerns	0.02	0.61	0.55			
Altruistic concerns	0.10	3.07	0.00			
Biospheric concerns	0.02	0.31	0.76			
Egoistic values	-0.06	-3.16	0.00			
Altruistic values	-0.01	-0.38	0.70			
Biospheric values	0.17	6.13	0.00			
DV: AR						
Model 1				0.05	21.86	0.00
AC	0.30	4.68	0.00			
Model 2				0.23	18.30	0.00
AC	0.09	1.32	0.19			
Egoistic concerns	0.24	4.29	0.00			
Altruistic concerns	0.12	12.50	0.01			
Biospheric concerns	0.07	0.84	0.40			
Egoistic values	0.04	1.48	0.14			
Altruistic values	0.08	2.26	0.02			
Biospheric values	0.13	3.40	0.00			
DV: AC						
Model 1				0.22	39.55	0.00
Egoistic concerns	0.19	4.96	0.00			
Altruistic concerns	-0.13	-3.62	0.00			
Biospheric concerns	0.43	7.64	0.00			
Model 2				0.24	22.08	0.00
Egoistic concerns	0.18	4.34	0.00			
Altruistic concerns	-0.14	-4.01	0.00			
Biospheric concerns	0.36	5.87	0.00			

Egoistic values	-0.00	-0.10	0.92			
Altruistic values	0.02	0.74	0.46			
Biospheric values	0.08	2.81	0.00			
DV: Egoistic concerns				0.13	21.11	0.00
Model 1						
Egoistic values	0.12	4.76	0.00			
Altruistic values	0.07	1.99	0.05			
Biospheric values	0.14	4.09	0.00			
DV: Altruistic concerns				0.05	7.88	0.00
Model 1						
Egoistic values	0.01	0.44	0.66			
Altruistic values	0.13	3.19	0.00			
Biospheric values	0.07	1.72	0.09			
DV: Biospheric concerns				0.19	31.83	0.00
Model 1						
Egoistic values	-0.03	-2.01	0.05			
Altruistic values	0.05	2.08	0.04			
Biospheric values	0.17	7.59	0.00			

DV: Dependent variable.

Moreover, the results of the procedure described by Preacher and Hayes (2004) do not support the full-mediation hypothesis. Table 2 reports the results of the bootstrapped estimates decomposing the direct and indirect effects for each path in the causal chain. It seems that beliefs play an important mediation role in the causal chain. Indeed, AC, AR and altruist concerns have both an indirect and a total significant contribution in explaining the preference towards NBS strategies. In short, AR represents the strongest determinant of individuals' NBS preference, accounting for a total effect of $\beta = 0.24$.

Tables 2 Effects of independent variables on preferences of strategies through mediators.

DV: preference of NBS strategies	Direct effect	Indirect effect	Total effect
PN	0.15**	-	0.15**
	(0.07)		(0.07)
AR	0.17**	0.07***	0.24***
	(0.07)	(0.01)	(0.07)
AC	-0.17***	0.07***	-0.10*
	(0.05)	(0.01)	(0.05)
Egoistic concerns	-0.04	-0.02***	-0.06
	(0.07)	(0.01)	(0.07)
Altruistic concerns	0.11*	0.01***	0.12*
	(0.01)	(0.03)	(0.06)
Biospheric concerns	0.04	-0.04***	-0.00
	(0.09)	(0.00)	(0.08)
Egoistic values	-0.05*	-0.01	-0.04*
	(0.03)	(0.01)	(0.03)
Altruistic values	0.01	0.01	0.03
	(0.05)	(0.01)	(0.04)
Biospheric values	0.01	-0.00	0.01
	(0.05)	(0.02)	(0.06)

DV: dependent variable; bootstrapped standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < .001$

4. Discussion and Conclusion

We tested the VBN theory in the context of NBS strategies in order to mitigate food risk in the south of France. Findings confirm the causal chain of the theory, however, they do not support the full-mediation relationship for environmental values, as they do not engender the process with a sense of moral obligation to protect or restore nature. As this study has shown, individuals with strong personal norms and beliefs related to altruistic concerns and the ascription of responsibility show a high preference for NBS strategies. One can explain the influence of the altruistic concern using the particular context of flood risks, where people's concerns for the wellbeing and lives of others are important (Chantarat et al. 2019). Moreover, regarding the weight of the ascription of responsibility, our result is in line with recent studies (Mees et al., 2016; Alfred and Gary, 2019), highlighting that the management of flood risk is a societal responsibility shared between authorities and citizens. In terms of policy implications, our findings suggest that the planning of NBS should incorporate environmental and educational campaigns so as to encourage public responsibility towards nature and flood risk management. Additionally, these campaigns could promote altruistic concerns towards the membership of a local territory, which may activate personal norms and increase public support for the implementation of NBS. Moreover, these campaigns should pay particular attention to the youngest (15-24 years) and oldest (+55 years) age groups, whose ascription of responsibility and altruistic concern are less than the mean of total sample (see Appendix 3).

Nevertheless, the predicting power of the socio-psychological factors is moderate, as these factors explain only 7% of the variance of the preference for NBS strategies. This can be explained by the importance of economic and social costs from land use change in an urbanised area, which is under strong demographic pressure. Indeed, Stern et al. (2000) suggest that the higher the costs and the importance of environmental impact, the less the social-psychological variables explain the public's support. This, then emphasises the need to analyse other factors, such as extrinsic motivations or contextual factors, in order to understand the acceptability of NBS strategies.

References

Allred, S., & Gary, G. (2019). Riparian landowner decision-making in the context of flooding: an application of the theory of planned behavior. *Environment Systems and Decisions **39***, 396–408.

Andersson, E., Borgström, S., & McPhearson, T. (2017). Double Insurance in Dealing with Extremes: Ecological and Social Factors for Making Nature-Based Solutions Last. *in "Nature-based Solutions to Climate Change Adaptation in Urban Areas, Theory and Practice of Urban Sustainability Transitions", N. Kabisch et al. (eds.)*, 51-64.

Arfaoui, N., & Gnonlonfin, A. (2020). Testing Meta-Regression Analysis in the context of NBS restoration measures: The case of Brague River. *Working Paper ESDES n° 2020-02*.

Chantarat, S., Oum, S., Samphantharak, K., & Sann, V. (2019). Natural Disasters, Preferences, and Behaviors: Evidence from the 2011 Mega Flood in Cambodia. *Journal of Asian Economics **63***, 44–74.

Drews, S., & Bergh, J. C. (2015). What explains public support for climate policies? A review of empirical and experimental studies. *Climate Policy*, 1-21.

Dunlap, R. E., & Van-Liere, K. D. (1978). The 'new environmental paradigm': A proposed measuring instrument and preliminary results. *Journal of Environmental Education **9***, 10–19.

Eggermont, H., Balian, E., Azevedo, J. M., Beumer, V., Brodin, T., Claudet, J., . . . W. W. Weisser, X. L.-R. (2015). Nature-based Solutions: New Influence for Environmental Management and Research in Europe. *GAIA 24/4 :*, 243– 248.

Gao, Y., Church, S. P., Peel, S., & Prokopya, L. S. (2018). Public perception towards river and water conservation practices: Opportunities for implementing urban stormwater management practices. *Journal of Environmental Management **223*** , 478–488.

Hiratsuka, J., Perlaviciute, G., & Steg, L. (2018). Testing VBN theory in Japan: Relationships between values, beliefs, norms, and acceptability and expected effects of a car pricing policy. *Transportation Research Part F **53***, 74–83.

Josephs, L. I., & Humphries, A. T. (2018). Identifying social factors that undermine support for nature-based coastal management. *Journal of Environmental Management **212***, 32-38.

López-Mosquera, N., & Sánchez, M. (2012). Theory of Planned Behavior and the Value-Belief-Norm Theory explaining willingness to pay for a suburban park. *Journal of Environmental Management **113***, 251-262.

Mees, a., Tempels, B., Crabbé, A., & Boelens, L. (2016). Shifting public-private responsibilities in Flemish flood risk management. Towards a co-evolutionary approach. *Land Use Policy **57***, 23–33.

Nesshöver, C., Assmuth, T., Irvine, K. N., Rusch, G. M., A.Waylen, K., Delbaere, B., . . . Wittmer, H. (2017). The science, policy and practice of nature-based solutions: An interdisciplinary perspective. *Science of the Total Environment **579***, 1215–1227.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers **36,** 4*, 717-731.

Préfecture des Alpes Maritimes. (2016). *Inondations des 3 et 4 octobre 2015: Retour d'expérience.* Rapport final.

Raymond, C. M., & Kenter, J. O. (2016). Transcendental values and the valuation and management of ecosystem services. *Ecosystem Services **21***, 241–257.

Schwartz, S. H. (1977). Normative influences on altruism. *Advances in experimental social psychology **10,** 1*, 221-279.

Schwartz, S. H. (1992). Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries. *Advances in Experimental Social Psychology **25***, 1-65.

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

Stern, P. C. (2000). Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues, Vol. **56,** No. 3,*, 407–424.

Stern, P. C., Kalof, L., Dietz, T., & Guagnano, G. A. (1995). Values, beliefs and proenvironmental action: Attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology*, 1611–1636.

Stern, P., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism. *Research in Human Ecology **6***, 81-97.

Ünal, A. B., Steg, L., & Granskaya, J. (2019). "To support or not to support, that is the question". Testing the VBN theory in predicting support for car use reduction policies in Russia. *Transportation Research Part A **119***, 73–81.

Appendix 1: Corrected correlation between items and environmental values and concerns constructs

Items	Egoistic	Altruistic	Biospheric
Values			
Wealth: material possessions, money	-	-0.00	-0.00
Influential: having an impact on people and events	**0.43**	0.21	0.11
Social justice: correcting injustice, care for the weak	0.15	-	0.31
Helpful: working for the welfare of others	0.07	**0.47**	0.45
Preventing pollution	0.05	0.40	-
Respecting the earth: living in harmony with other species	0.07	0.43	**0.76**
Concerns			
My health	-	0.36	0.34
My prosperity	**0.50**	0.30	0.16
People in the municipality	0.26	-	0.11
Future generations	0.35	0.18	0.55
Plants	0.26	0.31	-
Animals	0.26	**0.37**	**0.83**

Note: For each item, the highest correlation is printed in bold typeface. The correlations between values included in a scale and the specific scale itself were corrected for 'self-correlations', i.e., in this case, corrected-item total correlations are printed.

Appendix 2: Corrected correlation between items and AC, AR and PN

Items	AC	AR	PN
Rivers are natural ecosystems that need to be protected / restored. (AC1)	0.30	0.29	**0.42**
It is important to develop local agriculture in rivers' floodplains. (AC2)	**0.49**	0.17	0.25
It is important to develop recreational activities in rivers' floodplains. (AC3)	**0.38**	0.11	0.12
I feel partly responsible for the reduction of biodiversity. (AR1)	0.45	**0.81**	0.49
I feel partly responsible for climate change. (AR2)	0.22	**0.81**	0.50
I feel responsible for massive urbanisation and the mineralisation of soils. (AR3)	0.14	**0.63**	0.44
I personally feel obliged to preserve/restore nature as much as possible. (PN1)	0.32	0.45	**0.66**
I feel morally obligated to preserve/restore nature, regardless of what other people are doing. (PN2)	0.35	0.42	**0.61**
I should be a better person if I value nature more than money. (PN3)	0.13	**0.43**	0.38

Note: For each item, the highest correlation is printed in bold typeface. The correlations between the values included in a scale and the specific scale itself were corrected for 'self-correlations'; that is, in this case, corrected-item total correlations are printed.

Appendix 3: Mean of VBN items by demographic characteristics of respondents

Age (years) and sex	Values			Concerns			AC	**AR**	PN
	Egoistic	Altruistic	Biospheric	Egoistic	**Altruistic**	Biospheric			
15-24	4.37	3.94	4.89	0.62	**0.32**	1.39	0.67	**0.21**	0.68
25-34	3.77	4.86	5.24	0.92	0.71	1.60	0.69	0.54	0.85
35-44	3.75	4.83	5.34	0.94	0.82	1.45	0.79	0.54	0.84
45-54	3.63	5.05	5.37	0.85	0.93	1.61	0.79	0.50	0.93
55-64	3.63	4.76	5.27	0.91	**0.66**	1.49	0.91	0.72	0.85
65+	2.99	4.54	4.92	0.81	**0.69**	1.50	0.73	**0.25**	0.72
Man	3.75	4.47	5.12	0.77	0.62	1.47	0.78	0.42	0.73
Woman	3.47	4.84	5.18	0.90	0.77	1.54	0.74	0.46	0.87