

PRO-ENVIRONMENTAL CONSUMPTION: EFFECTS ON SUBJECTIVE WELL-BEING AS A PROXY FOR UTILITY

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1. Introduction

It is widely conceded that human behaviour is responsible for the main ecological problems including pollution, climate change and global warming (Swim et al., 2011), and consequently, environmental literature emphasizes that changing values and behaviours including consumption habits is essential to overcome these problems (Klößner, 2013). But how would these changes in consumption affect the well-being of consumers? Since environmentally responsible behaviour is envisaged in self-sacrificial terms, political discourse on environmental sustainability often implies a contradiction between environmental welfare and human well-being (Brown and Kasser, 2005). Nevertheless, several empirical studies suggest that a wide range of pro-environmental consumption behaviours are associated with higher subjective well-being or life satisfaction (Brown and Kasser, 2005; Guillen-Royo, 2019; Schmitt et al., 2018; Welsch and Kühling, 2010). Still, studies reporting this relationship in specific dimensions are limited.

This paper explores the relationship between subjective well-being (SWB) and pro-environmental consumption (PEC) at individual and composite levels including the comparison of the effects of two specific dimensions of sustainable consumption using three waves of the Aspects of Daily Life dataset from Italy. The former dimension which was framed as pro-active sustainable behaviour includes attitudes and behaviours of consumers toward ecologically efficient products – the goods and services designed sustainably, and the second, framed as avoidance behaviour comprises consumption habits avoiding or reducing engagements in environmentally harmful behaviours. Through this design, the paper aims to investigate the relationship by assuming that it is stronger for more frequent pro-active behaviour rather than avoidance behaviour. Even though the classification of sustainable consumption in this way is a novelty, considering the characteristics of variables constructing the relevant composite indicators, pro-active behaviour is similar to (mostly) costlier pro-environmental consumption, while avoidance behaviour recalls behaviours requiring more effort rather than additional expenses.

In this regard, we already know that costlier consumption is strongly associated with life satisfaction compared to less costly behaviours (Schmitt et al., 2018).

In addition, we also examined whether a pro-environmental choice is a utility-maximizing decision under welfare economics, or this type of consumption is consistent with distorted preferences. With all these settings, the paper aims to provide further knowledge on the relationship between pro-environmental behaviour and well-being for facilitating policies in order to improve both ecological and human well-being.

The rest of the paper is organized as follows. Section 2 describes the data, introduces the hypotheses, and explains the methodology. Section 3 outlines the results. Finally, Section 4 recaps the main findings and concludes the report.

2. Methodology

2.1. Data

This paper employs the data based on the three waves (2014, 2019, 2020) of the Aspects of Daily Life (AVQ) survey from Italy. It is an annual multipurpose survey conducted by the Italian National Institute of Statistics (ISTAT) since 1993 by interviewing about 50,000 people from 20,000 households on the trends and patterns of the individuals' and households' daily life activities, behaviours, and problems. The data includes information about family composition, employment, education, health status, perceptions of public services, technology use, housing conditions, food consumption, lifestyle, and social engagement.

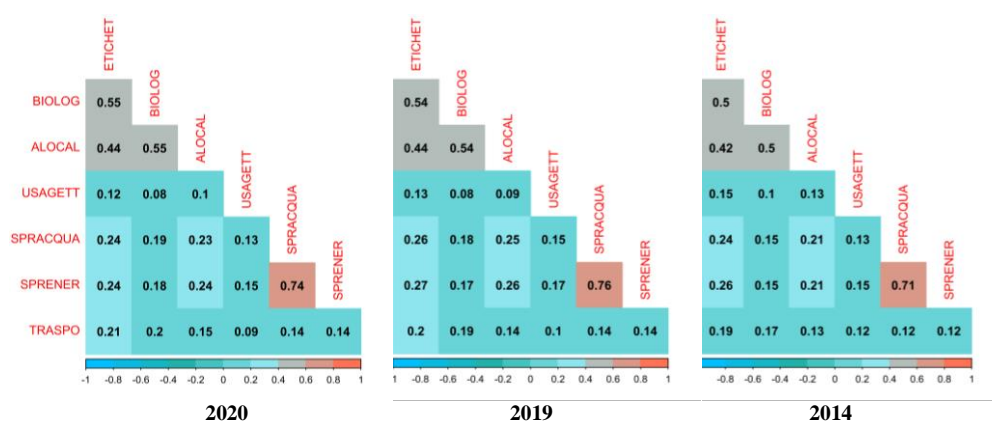
Starting from 2010, the AVQ survey also includes a couple of questions regarding the life satisfaction of individuals. This paper measures subjective well-being based on the question asking “currently, how satisfied are you with your life as a whole?” on a 0-10 rating scale in which 0 means “not satisfied at all” and 10 means “very satisfied”. The average life satisfaction of people aged over 14 first decreases from 7.2 in 2010 to 6.8 in 2012, later remains its value until 2015 and then starts to rise and reach 7.2 in 2020 again (ISTAT, 2021). The average grade is the highest in the North and the lowest in the South of the country.

To investigate pro-environmental consumption behaviours, several sustainable habits including reading labels during shopping, purchasing organic food, purchasing local food, saving water, saving electricity, using disposable products, preferring alternative transportation means to private vehicles, carpooling and throwing paper in streets are measured based on the frequency scale ranging between 1 (never) and 4 (habitually). These variables are present in the 2014, 2019

and 2020 waves. Furthermore, waste sorting habits with 9 domains¹ are examined on the 3-ratings frequency scale where 1 is “never”, 2 is “sometimes”, and 3 is “always” starting from 2017.

Only the individuals who are at age of 16 and more were considered for the analysis. The maximum percentage of missing values (4.41%) for an individual variable was for the variable representing “Alternatives to a private car” in the 2014 survey (it was around 2% for all remaining variables across three years). To deal with missing data, kNN, random forest and hot-deck imputation techniques were implemented; from which the data with kNN imputation was employed.

Figure 1 – Correlation between the pro-environmental consumption variables.



Note: ETICHET = Reading labels, BIOLOG = Organic food, ALOCAL = Local food, USAGETT = Disposable products, SPRACQUA = Saving water, SPRENER = Saving electricity, TRASPO = Alternatives to a private vehicle.

Four composite indicators illustrating sustainable behaviour were constructed as an arithmetic mean of the same scale variables. 7 variables - reading labels during the shopping, purchasing organic food, purchasing local food, saving water, saving electricity, using disposable products, and preferring alternative transportation means to private cars, were employed to build the PEC Index. Throwing paper in streets and carpooling were excluded because of negative effects on the total scale. Cronbach's alpha is 0.68 for the 2020, 0.69 for the 2019, 0.67 for the 2014 datasets meaning that the internal consistency is moderate. Moreover, two different indices were built to include pro-environmental consumption (1) aiming to reduce negative ecological footprint through avoiding harmful behaviours and (2) employing pro-

¹ It includes sorting habits for paper, glass, medicine, battery, metals, plastic, organic, textile and other materials.

active behaviours such as consuming products with better environmental efficiency.

Table 3 – Descriptive statistics for the selected variables and composite indicators.

Variables	2020		2019		2014	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Life satisfaction ^a	7.18	1.60	7.09	1.70	6.80	1.79
Reading labels ^b	2.94	1.06	2.95	1.07	2.84	1.11
Organic food	2.49	0.99	2.41	1.00	2.15	1.00
Local food	2.85	0.97	2.77	1.01	2.54	1.06
Throwing paper in streets	3.79	0.63	3.75	0.66	3.72	0.68
Saving water	3.55	0.81	3.50	0.85	3.54	0.81
Saving electricity	3.59	0.77	3.55	0.80	3.63	0.73
Disposable Products	2.62	0.96	2.67	0.97	2.68	0.98
Alternatives to a private car	2.19	1.14	2.17	1.15	2.23	1.16
Income ^c	2.67	0.56	2.64	0.58	2.48	0.64
Proportion of Females	0.52		0.52		0.52	
Composite Indicators						
PEC Index	2.89	0.56	2.86	0.58	2.80	0.57
Avoidance Behaviour Index	2.73	0.69	2.70	0.70	2.55	0.72
Pro-Active Behaviour Index	3.11	0.66	3.08	0.68	3.14	0.65
Waste Sorting Index ^d	2.73	0.69	2.70	0.70	2.55	0.72

^a 0 (not satisfied at all), 10 (very satisfied)

^b 1 (never), 2 (rarely), 3 (sometimes), 4 (habitually): for all the PEC variables and Indices

^c 1 (absolutely insufficient), 2 (scarce), 3 (adequate), 4 (excellent)

^d 1 (never), 2 (sometimes), 3 (always)

Three variables - habits of saving water, saving electricity, and using alternative transportation means to private vehicles, are included to calculate the former composite indicator with an arithmetic mean technique (Cronbach's alpha for 2020 is 0.54; for 2019 is 0.55; for 2014: 0.50 – weaker internal consistency compared to other indicators). The same method was applied for the latter composite indicator with four components – reading labels during shopping, buying organic food, buying local food, and preferring disposable products (Cronbach's alpha for all three years is 0.64). The last composite indicator for sustainable behaviour was set with waste sorting habits excluding “other waste”. Waste Sorting Index has Cronbach's alpha of 0.82 and 0.84 respectively in 2020 and 2019 which demonstrate high internal consistency. Along with Cronbach's alpha, correlation analysis between the pro-environmental variables was also performed (Figure 1) in which the results provide that there is a moderate correlation rate among the components of Pro-Active Behaviour Index (excluding consuming disposable products) or Avoidance Behaviour Index (excluding using alternative transportation means rather than private vehicles). Since all the composite indicators are formative in this study (the construct gets its meaning from the

components (Diamantopoulos et al., 2008)), low correlations are acceptable (Bollen, 1984). Therefore, both the consumption of disposable products and alternative transportation means were remained in the constructs to prevent a restriction in the domain of the indices (MacKenzie et al., 2005).

Several socio-demographic characteristics such as gender, age, civil status, income, education, occupation, health status and region of residency are included in the set of control variables which are considered important and widely used covariates in well-being and happiness studies.

Table 1 provides summary statistics for life satisfaction (dependent variable), income, gender and pro-environmental consumption behaviours as individual variables and composite indicators.

2.2. Empirical Models

Existing evidence suggests that there is a positive relationship between pro-environmental consumption and subjective well-being, and the former is explained under the distorted choice models rather rational choice model. From a theoretical point of view, using life satisfaction as a proxy for experienced utility allows testing the discrimination between competing theories (Frey and Stutzer, 2002). Obtaining positive and significant coefficients for the pro-environmental consumption in the estimation of subjective well-being would provide evidence for distorted choice models since under the rational choice theory, net marginal utility of quality should be zero for optimal choice as marginal utility of quality is balanced with marginal disutility of quantity foregone (because the quantity is not observable in the dataset, semi-reduced experienced utility function was used where quantity is represented as a function of income and price ($F(p,Y)$); for theoretical and detailed empirical framework, see Welsch and Kühling (2010)). This model construction enables us to examine whether pro-environmental consumption decision is subject to the rational choice or the distorted choice (Hypothesis 1). To test this approach, the following model was investigated:

$$W_i = \alpha + \beta_i X_i + \gamma Y_i + \theta_i C_i + \delta R_i + \varepsilon_i \quad (1)$$

where W_i denotes life satisfaction as an ordered categorical variable (0-10), X_i is the environmental friendliness (quality) of the consumption, Y_i is income², C_i is the set of control variables including gender, age, civil status, education, occupation, and health status, and R_i is the region of residency.

² It was employed for deriving semi-reduced experienced utility function to examine whether pro-environmental consumption decision is subject to the rational choice or the distorted choice.

Model 1 also investigates the direct effects of pro-environmental consumption on subjective well-being in which this paper assumes that individuals with more frequent pro-environmental consumption would experience higher life satisfaction compared to those who engage in the same behaviours less frequently.

To compare the levels of the influences of the avoidance behaviour and pro-active environmental behaviour on subjective well-being, the following model was examined:

$$W_i = \alpha + \beta_a X_{a_i} + \beta_p X_{p_i} + \theta_i C_i + \delta R_i + \varepsilon_i \quad (2)$$

where X_{a_i} and X_{p_i} respectively denote Pro-Active and Avoidance Behaviour composite indicators. Model 2 enables us to test Hypothesis 2 assuming that the relationship is stronger for more frequent pro-active behaviour rather than avoidance behaviours since the former (usually) have either higher financial costs (such as purchasing more expensive organic and local food) or require additional effort (such as reading labels).

Considering the characteristics of the variables of interest and also previous research, ordered probit regression was employed to report the results.

3. Results

The results regarding the sign of coefficients of the socio-demographic control variables in relation to life satisfaction are consistent with the common findings in the pertinent literature. Moreover, when single PEC regressor models controlling socio-demographic variables and region of residency is considered, the coefficients for each domain of sustainable consumption become significant in all the models (results are not reported in this paper). However, in this section, only the results of multiple PEC regressors models are reported.

Table 2 provides the results of ordered probit estimations for Models 1. Two different groups of regressors were considered for this empirical model. The first one includes only composite indicators to represent sustainable consumption, while the second one includes individual domains of PEC behaviours and Waste Sorting Index (a composite indicator). As can be seen in the table, both the PEC Index (2020: 0.19, $p < 0.01$; 2019: 0.23, $p < 0.01$; 2014: 0.18, $p < 0.01$) and the Waste Sorting Index (2020: 0.10, $p < 0.01$; 2019: 0.10, $p < 0.01$) positively predict life satisfaction across three years. The former has a significantly stronger effect on life satisfaction compared to the latter both in 2019 and 2020; while it is not estimable for 2014 since waste sorting habits were not collected in this year. Considering specific domains of pro-environmental consumption, only organic food and using

alternative transportation means instead of private vehicles remain insignificant (at 95% significance level) across three years. Saving electricity is positively and significantly associated with life satisfaction in 2019, while its effect becomes insignificant in the 2014 and 2020 datasets. Conversely, using disposable products has a positive and significant effect on subjective well-being in 2014 and 2020, and an insignificant effect in 2019 (significant at 90% significance level, $p=0.0582$). All the remaining PEC variables and Waste Sorting Index positively and significantly correlated with life satisfaction controlling socio-demographic attributes and region of residency across three years. Furthermore, according to the specification 1, positive and significant coefficients for the pro-environmental consumption range provide evidence for distorted choice models which is consistent with existing evidence in social sciences that individuals underestimate future utility from intrinsic attributes (Frey and Stutzer, 2002). These results support Hypothesis 1.

Table 2 – *Life satisfaction as a function of pro-environmental consumption (Model 1).*

Composite Indicators & Variables	2020		2019		2014 ^a	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Model with only CI's						
PEC Index	0.190***	0.010	0.225***	0.009	0.176***	0.010
Waste Sorting Index	0.104***	0.012	0.102***	0.011		
Income	0.358***	0.010	0.372***	0.009	0.344***	0.009
Pseudo R ² (Nagelkerke R ²)	0.137		0.148		0.160	
Model with Variables						
Waste Sorting Index (CI)	0.099***	0.012	0.097***	0.011		
Reading labels	0.041***	0.006	0.063***	0.006	0.054***	0.006
Organic food	0.009	0.007	-0.002	0.007	0.002	0.007
Local food	0.058***	0.007	0.057***	0.006	0.039***	0.006
Throwing paper in streets	0.058***	0.009	0.066***	0.008	0.055***	0.008
Saving water	0.053***	0.010	0.042***	0.009	0.041***	0.009
Saving electricity	0.014	0.011	0.041***	0.010	0.014	0.010
Disposable Products	0.015***	0.006	0.011*	0.006	0.027***	0.006
Alternatives to a private car	-0.006	0.005	0.002	0.005	-0.010***	0.005
Income	0.355***	0.010	0.373***	0.009	0.344***	0.009
Pseudo R ² (Nagelkerke R ²)	0.140		0.148		0.163	

Control variables: gender, age, civil status, education, income, occupation, health status, region

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

^a the results of the 2014 survey cannot be directly compared with 2019 and 2020 since the 2014 dataset does not include waste sorting habits.

To test Hypothesis 2, the Avoidance Behaviour Index and the Pro-active Behaviour Index were used as simultaneous predictors in Model 2 (Table 3). The results provide that both indices are positively and significantly associated with life

satisfaction across three years. However, the Pro-active Behaviour Index (2020: 0.133, $p < 0.01$; 2019: 0.142, $p < 0.01$; 2014: 0.126, $p < 0.01$) has considerably higher coefficients compared to the Avoidance Behaviour Index (2020: 0.061, $p < 0.01$; 2019: 0.088, $p < 0.01$; 2014: 0.045, $p < 0.01$), meaning that pro-environmental consumption with preferences for the products with higher environmental efficiency has a stronger effect on subjective well-being compared to sustainable choices aiming to avoid or less frequently engage in consumption decisions having negative ecological externalities (Figure 2). The results support Hypothesis 2. To our knowledge, this is the first study investigating the association between subjective well-being and pro-environmental consumption concerning the comparison of these two dimensions. However, if we consider pro-active sustainable behaviour costly and avoidance behaviour less costly, then our findings confirm the previous findings emphasizing that costlier consumption is strongly associated with life satisfaction compared to the less costly behaviours (Schmitt et al., 2018).

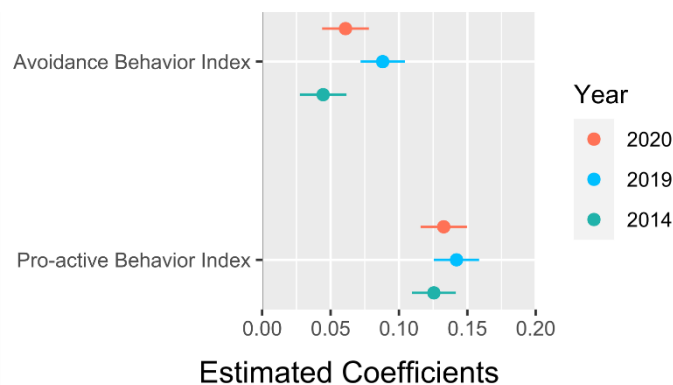
Table 3 – Life satisfaction as a function of the Avoidance and Pro-active Behaviour Indices (Model 2).

Composite Indicators	2020		2019		2014	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Avoidance Behaviour Index	0.061***	0.009	0.088***	0.008	0.045***	0.009
Pro-active Behaviour Index	0.133***	0.009	0.142***	0.008	0.126***	0.008
Pseudo R ² (Nagelkerke R ²)	0.135		0.146		0.161	

Control variables: gender, age, civil status, education, income, occupation, health status, region

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Figure 2 – Coefficients of Avoidance and Pro-active Environmental Behaviour Indices.



4. Concluding Remarks

This study implies that people systematically make imprecise predictions about the utility obtained from pro-environmental consumption, and this type of behaviour leads to higher subjective well-being. Several model constructions were built to test various assumptions in these regards by using three waves of a multipurpose survey from Italy. Findings show that individuals who more frequently engage in various types of sustainable consumption report higher life satisfaction, which was used as a proxy for utility, than those who less frequently behave environmentally friendly or who do not, controlling a wide range of socio-demographic variables and the region of residency. So, these results allow to argue that people may systematically mispredict, more precisely, underestimate the possible outcomes of their pro-environmental consumption and consequently, they fail to maximize their utility, which is evidence of the distorted choice theory. Considering the domains of sustainable consumption, results provide that life satisfaction is positively and statistically significantly associated with most of PEC variables and composite indicators in all three waves of Italian Aspects of Daily Life survey. So, these findings suggest that more frequent engagement in most domains of sustainable consumption associated with higher satisfaction with life, while a few of them have no significant impact on well-being, and furthermore, none of them causes a deterioration in life satisfaction.

4.1. Contribution and Limitations

These results are not new in pertinent literature, however, examining this relationship in two specific dimensions of sustainable behaviour contributes new findings to the literature. To my knowledge, this is the first study that implies satisfaction with life is differentially influenced by pro-active sustainable behaviour, representing the consumption of ecologically efficient products and avoidance behaviour representing avoiding or less frequently engaging in environmentally harmful consumption. Indeed, our findings show that the former has a considerably stronger effect on life satisfaction compared to the latter. However, it should be noted that if we consider pro-active sustainable behaviour costly (three of four variables constructing the Pro-Active Index imply higher costs for consumers) and avoidance behaviour less costly (all three variables constructing the Avoidance Index require more effort rather than additional expenses), our results confirm the previous results instead of being novelty in the pertinent literature.

Using life satisfaction as a proxy for utility allows studying problems empirically such as testing discrimination between competing explanations for empirical findings in human behaviour (Frey and Stutzer, 2002). So, data on life

satisfaction or happiness help to tackle important questions in economics; however, still, the results obtained from this type of survey should be treated critically and cautiously (Di Tella and MacCulloch, 2006). Here both pro-environmental consumption and life satisfaction are measured based on the self-reports which may constitute the main limitation of this study. On one hand, there is evidence that individuals incline to report their sustainable behaviours higher than their actual behaviour because of the social desirability effect (Tarrant and Cordell, 1997); while on the other hand, other research provides that this effect does not influence the accuracy of the measurement of the environmentally friendly behaviour (Kaiser, 1998). In this regard, the results are consistent with the findings of previous studies which support their robustness (Guillen-Royo, 2019). Another limitation is endogeneity because of omitted variable bias and reverse causality. As an example of the former, in the AVQ dataset, it was not possible to measure how the ecological concerns of respondents affect both sustainable consumption and life satisfaction. Indeed, perceived environmental threats and other unobserved factors may influence the variables of interest which may cause the omitted variable bias, however, employing a wide range of socio-demographic variables gave some confidence that this limitation was controlled in the best feasible way (Guillen-Royo, 2019; Schmitt et al., 2018; Welsch and Kühling, 2010). Considering reverse causality, on one hand, several studies provide that more happiness leads to less consumption (Güven, 2012), while others demonstrate that happiness causes improvements in consumption expenditures both in rural and urban areas (Zhu et al., 2020). On the other hand, there are studies providing that consumption has a positive effect on subjective well-being as well (Noll and Weick, 2015). Considering pro-social characteristics of pro-environmental behaviour (Schmitt et al., 2018), previous experimental and longitudinal research demonstrate that pro-social behaviour positively affects well-being (Dunn et al., 2014). However, the lack of this type of studies concerning sustainable behaviour limits the plausibility of this interpretation and gives rise to a necessity for future research with a longitudinal or experimental design to identify the direction of the causality (Guillen-Royo, 2019; Schmitt et al., 2018).

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SUMMARY

This paper contributes to the growing empirical evidence that engaging in pro-environmental consumption has positive consequences on satisfaction with life as well as strengthens the idea that this type of behaviour is subject to systematic deviations from utility-maximizing choices that consumers underestimate extra utility from sustainable consumption. Moreover, the results imply that pro-environmental consumption preferences for the products with a higher environmental efficiency has a stronger effect on subjective well-being compared to the sustainable choices characterized as to avoid or less frequently engage in consumption decisions having negative ecological externalities. The findings were obtained through using three waves (2014, 2019 and 2020) of Aspects of Daily Life dataset, an annual multipurpose sample survey in Italy; however, they are consistent with the results of similar studies in other countries including Germany, China, and the United States, and therefore, as Luechinger (2009) suggests in an equivalent situation in a different context, this approach may also be transferred to other countries.