

5 Where is the double dividend? The relationship between different types of pro-environmental behavior and different conceptions of subjective well-being

Nazaret Ibáñez-Rueda, Department of Applied Economics, Universidad de Granada; and Jorge Guardiola Wanden-Berghe, Institute of Peace and Conflicts, Department of Applied Economics, Universidad de Granada ¹

Abstract

The adoption of pro-environmental behaviors is essential to achieve the transition to a sustainable society. Previous evidence indicates that pro-environmental behaviors are positively associated with subjective well-being, lending support to the well-being dividend theory (namely that actions aimed at protecting the environment also improve well-being). In this study, we further examine the relationship between subjective well-being and pro-environmental behaviors, investigating whether the positive associations found extend to different types of behavior and different conceptions of well-being. We use three measures of well-being: life satisfaction (cognitive dimension), experienced emotions (affective dimension) and subjective vitality (eudaimonic dimension). We classify different pro-environmental behaviors on the basis of two criteria: the possible cost or benefit they entail for the individual who performs them, and the ease with which they can be observed by other people. Using regression analysis with data from a sample of students from the University of Granada, Spain, we found that the relationship between pro-environmental behaviors and subjective well-being differs according to the type of behavior and the dimension of well-being considered. Consistent with the well-being dividend theory, we found that actions that involve saving money are positively related to emotions, while actions that involve a cost, both in terms of money and time, are positively related to subjective vitality. However, we found no association between well-being and behaviors that do not entail any cost or benefit, and nonsignificant relations of certain behaviors with particular happiness measures. The nonsignificant relationships found between well-being and some categories of pro-environmental actions call for more research and political action to link sustainable behavior with well-being, in order to simultaneously boost happiness and pro-environmental behavior.

Keywords: pro-environmental behavior; subjective well-being; well-being dividend.

¹ Nazaret Ibáñez-Rueda, nibanez@ugr.es
Jorge Guardiola Wanden-Berghe, jguardiola@ugr.es

5. 1 Introduction

The growing concern for the environment has fostered sustainability research in a variety of disciplines. In this regard, one way to contribute to the sustainability literature is through research on subjective well-being,² which can be key to encouraging sustainable behaviors,³ such as recycling, reusing products or reducing overall consumption. The environmental situation requires us to change our behavior patterns, but caring for the environment does not have to be a sacrifice. Several studies reveal that people's well-being is positively correlated with how often they engage in pro-environmental behaviors, demonstrating that one can be happy caring for the environment (Binder & Blankenberg, 2017; Kaida & Kaida, 2016; Schmitt et al., 2018). Research on subjective well-being develops the concept of sustainable happiness and helps to discredit the dogma that consumption leads to happiness. In this vein, O'Brien (2008) defines sustainable happiness as the pursuit of happiness without exploiting other people, the environment or future generations. Similarly, Ulluwishewa (2016) points out that in order to achieve sustainability and happiness, we have to change the way we interact with other human beings and nature, abandoning selfish and exploitative relationships. Uniting the notions of sustainability and happiness creates potential for individual and global well-being.

Numerous studies find evidence of a positive relationship between ecological behavior and happiness (Zawadzki et al., 2020), helping to bolster the theory of the double dividend (Jackson, 2005), which argues that acting pro-environmentally is not only good for the environment, but is also accompanied by higher levels of happiness (Guillen-Royo, 2010; Guillen-Royo et al., 2017). However, the previous literature does not conclusively clarify whether this positive relationship occurs in a generalized way: it could be limited to behaviors with certain characteristics, or it may depend on the dimension of well-being considered. Furthermore, most of the previous studies approximate subjective well-being through life satisfaction, taking into account a single conceptualization of well-being.

In this paper, we build on the double dividend theory, seeking to further explore the relationship between pro-environmental behavior and subjective well-being, using different conceptions of well-being and different categories of pro-environmental behavior. We consider three dimensions of well-being: the affec-

² We use subjective well-being (or just well-being) as a synonym for happiness to broadly refer to the experience of being well. This ranges from cognitive judgments and affective evaluations to being fully functioning (Diener et al., 2002; Ryan & Deci, 2001). Thus, we cover the cognitive, affective and eudaimonic dimensions of well-being.

³ We use the terms *pro-environmental behavior*, *ecological behavior*, or *sustainable behavior* to refer to any responsible behavior that minimizes damage to, or even benefits, the environment (Steg & Vlek, 2009).

tive dimension, which is based on the PANAS scale (Watson et al., 1988); the cognitive dimension, approximated by life satisfaction (Dolan et al., 2011); and the eudaimonic dimension, which is reflected through subjective vitality (Guillen-Royo, 2019; Ryan & Frederick, 1997). We group the different pro-environmental behaviors into different categories: on the one hand, we classify these behaviors on the basis of whether they entail a monetary cost or saving, entail an extra cost in terms of time, or do not entail either a cost or a saving; on the other hand, we classify them according to whether or not they can be easily observed by third parties. To the best of our knowledge, this is the first time that different dimensions of well-being have been related to different categories of pro-environmental behavior, differentiating behaviors on the basis of their characteristics. The estimations are based on a sample of 973 students from the University of Granada, Spain.

The rest of this study is divided into the following sections: in Section 2 we present a description of the empirical evidence on the relationship between pro-environmental behavior and well-being; in Section 3 we describe the data used in the research, present the hypotheses and the method of analysis; in Section 4 we detail the results obtained; in Section 5 we present a discussion of the results and reflect on the limitations of this research and future research opportunities; and finally, in Section 6 we present our conclusion.

5.2 Literature Review: Well-being and the environment

The environment and well-being are closely related concepts, and a growing amount of research is focusing on the link between the two. There is increasing evidence indicating that behaving in a sustainable way also brings about greater levels of well-being (Zawadzki et al., 2020), supporting Jackson's (2005) conceptualization of the well-being dividend.

This theory, which comes with strong empirical evidence, calls into question the popular belief that pro-environmental behaviors involve a sacrifice that diminishes quality of life. In fact, several studies indicate that frequent involvement in pro-environmental behaviors correlates positively with well-being (Kasser, 2017). In this respect, Suárez-Varela et al. (2014) find, for a sample from Granada, Spain, that awareness and pro-environmental actions aimed at saving water have a positive or non-significant influence on subjective well-being, but never a negative influence. Using samples from Canada and the United States, Schmitt et al. (2018) find that participation in 39 pro-environmental behaviors predicts greater life satisfaction in all cases except for using public transportation or carpooling, and using the washer or dryer only when they are full. Binder and Blankenberg (2016) study environmental activism in Germany, finding that environmental concerns lead to a greater propensity for volunteering and this volunteering is positively associated with well-being for those who are very concerned about the environment. For a sample from Stockholm, Sweden, Kaida and Kaida (2016) find that pro-environmental behavior aimed at saving water and energy in the home not only improves current subjective well-being, but also improves expectations of future subjective well-being. Using data from Great Britain, Binder

and Blankenberg (2017) replicate the positive relationship between life satisfaction and pro-environmental behavior.

In sum, research has demonstrated the positive relationship between pro-environmental behavior and subjective well-being, thus providing evidence to support the double dividend theory (Jackson, 2005). However, some studies found exceptions to the theory. The paper by Schmitt et al. (2018) reports that the relationship between well-being and pro-environmental behavior varies according to the characteristics of the behavior. In particular, the authors find that life satisfaction is most strongly predicted by behaviors that involve greater social interaction, behaviors that can be easily observed by others and behaviors that involve direct costs in terms of money, time and effort. This could explain why the double dividend may be more obvious in some research than in others. Yet, in addition to differences in the intensity of the association, a few studies show negative relationships between certain pro-environmental behaviors and well-being. For example, Ibáñez-Rueda et al. (2020) find, in a Spanish sample, that environmental activism is negatively associated with life satisfaction. Also using a sample from Spain, Binder et al. (2020) report a negative relationship between life satisfaction and a behavior index composed of 20 different environmentally-friendly actions. Similarly, Verhofstadt et al. (2016) point out that some ecological behaviors, such as reducing meat consumption or not using the car, are related to lower life satisfaction in a Belgian sample.

Taking into account these few exceptions to this theory, further exploration of the well-being dividend theory is merited. To that end, and in order to achieve the objective of this research, we test the relationship between different categories of pro-environmental actions and well-being.

5.3 Methodology

5.3.1 Field work

In this research, we use a new database comprising 1283 students from the University of Granada, Spain. The field work was undertaken during the months of March and April 2019. A research team visited classrooms and provided a link to the questionnaire, which was accessible online via Qualtrics. The students did not receive any payment for filling in the questionnaire. After deleting missing values, as well as 5 observations that made no sense (they appeared to be answered randomly), the final sample used in our research comprised 973 observations.

5.3.2 Variables and hypotheses

To evaluate the subjective well-being of individuals we use three indicators: life satisfaction, experienced affection and subjective vitality. Each one reflects a different understanding of subjective well-being.

Life satisfaction is related to the cognitive assessments and judgments people make about their life when they think about it (Dolan et al., 2008). We measure the variable *life satisfaction* through the question “How satisfied are you at this moment with your life as a whole?” Survey participants answered the ques-

tion using an 11-point Likert scale ranging from 0 (*completely dissatisfied*) to 10 (*completely satisfied*).

Through the feelings and emotions an individual experiences, we evaluate the affective component of subjective well-being. We use the *Positive and Negative Affect Schedule* (PANAS) proposed by Watson et al. (1988), which is composed of 20 items describing different feelings and emotions, 10 relating to positive affect (*motivated, alert, excited, inspired, strong, determined, attentive, enthusiastic, active, proud*) and 10 to negative affect (*irritable, annoyed, upset, embarrassed, angry, nervous, guilty, fearful, aggressive, restless, insecure*). For each item, the individuals indicated how much they had felt these during the last seven days using a 5-point Likert scale (1 = very slightly or not at all, 2 = a little, 3 = moderately, 4 = quite a lot, and 5 = extremely). The variable *emotions* is calculated as the difference between the sum of the positive affect scores and the sum of the negative affect scores.

Finally, we use subjective vitality to reflect the eudaimonic dimension of well-being. Subjective vitality can be defined as the conscious experience of possessing energy and vivacity (Ryan & Frederick, 1997), and is considered an aspect of eudaimonic well-being because it is part of being in a state of full psychological and physical functioning (Guillen-Royo, 2019). We calculate the variable *vitality* as the arithmetic mean of the scores given to six statements related to a feeling of vitality: “I feel alive and vital”; “Sometimes I am so alive I just want to burst”; “I have positive energy and vigor”; “I get excited each new day”; “I am usually alert and awake”; “I feel full of energy.” The answers to each statement are indicated on a 5-point scale (1 = Totally false; 2 = Not so true; 3 = Somewhat true; 4 = Fairly true; 5 = Extremely true).

We approximate pro-environmental behavior by asking individuals to score the frequency with which they perform the actions in Table 5.1. Participants indicated whether they engaged in these behaviors very little or not at all (1); a little (2); moderately (3); quite a lot (4); or extremely often (5). They were also given the option to indicate if any of the behaviors were not applicable to them. We re-coded the answers to the item “Throw away food” so that high scores denote environmentally-friendly behavior in all cases.

Based on these responses, we calculate different specific pro-environmental behavior indices using a taxonomy that incorporates the characteristics of each pro-environmental behavior. To this end, we establish two different classifications, based on the cost or benefit to the individual who performs the behavior and based on the ease of being observed by others. Thus, we first classify the actions into different categories according to whether they involve a monetary cost, a cost in terms of time, a saving of money, or do not involve a cost or a saving. Secondly, we distinguish between behaviors that are easily observed by others and behaviors that are more private and difficult for third parties to observe. Table 5.1 shows this classification of behaviors. Each index is calculated as the average of the scores obtained in the behaviors of the specific category. To calculate this average, the sum of the scores is divided by the number of behaviors in that particular category to which the individual responded, so that the index score is not affected if one of the behaviors is not applicable to the individual.

Table 5.1. Classification of pro-environmental behaviors

	According to cost				According to observability	
	Cost money	Cost time	Save money	Neutral (no cost or savings)	Easily observed	Not easily observed
Turn off lights in rooms that are not being used			X			X
Put on more clothes when it's cold at home, instead of turning on or turning up the heating			X			X
Decide not to buy something because it has an excess of packaging		X				X
Buy recycled products such as recycled toilet paper or tissues	X				X	
Take your own bag with you when you go shopping				X	X	
Separate the garbage. For example, paper, plastic, glass		X			X	
Use public transport (e.g. bus, train) instead of using the car			X		X	
Walk or cycle for short distances			X		X	
Avoid taking planes when possible			X			X
Participate in demonstrations in support of the environment		X			X	
Reduce consumption of meat or animal products				X		X
Buy organic or eco-labelled food	X				X	
Buy organic or eco-labelled products (furniture, clothing)	X				X	
Preference for buying local products		X				X
Don't throw away food			X			X
In general, try to reduce consumption in everyday life			X		X	

Based on the literature reviewed in section 2, we expect that, in general, the most frequent participation in pro-environmental behaviors is positively related to subjective well-being (Hypothesis 1), thus confirming a double dividend. This hypothesis has been widely tested in the literature, however, most studies that analyze this relationship tend to consider only the cognitive dimension of well-being. We expect that this positive association also occurs for the affective and eudaimonic dimensions.

Secondly, we want to investigate whether the intensity of the relationship between pro-environmental behavior and subjective well-being differs according to the type of behavior (Hypothesis 2). This hypothesis is strongly supported by the study of Schmitt et al. (2018). The findings of Ibáñez-Rueda et al. (2020) are also consistent with this hypothesis, as they find that sustainable consumption and environmental activism have different associations with subjective well-being.

Finally, we explore the hypothesis that the magnitude of the relationship between different types of pro-environmental behavior and well-being differs according to the dimension of subjective well-being considered (Hypothesis 3). This hypothesis complements hypothesis 2 and constitutes the main innovation of our research because, although some previous studies consider different types of behavior and different measures of well-being, their contributions are different from those of this research. For example, Martin et al. (2020) include two indicators of pro-environmental behavior (*household* and *nature conservation*) and two measures of subjective well-being (evaluative and eudaimonic well-being), but treat both concepts as outcome variables, without analyzing the relationship between them. Although Ibáñez-Rueda et al. (2020) do analyze the relationship between different types of pro-environmental behavior (sustainable consumption and environmental activism) and different measures of subjective well-being (cognitive, affective and eudaimonic), the distinction between pro-environmental behavior is based on conceptual criteria and not on the specific characteristics of the different activities. Therefore, this hypothesis is not entirely supported by previous studies, even though some research shows that different well-being dimensions correlate differently with different observable characteristics (Graham & Nikolaeva, 2015; Rojas & Guardiola, 2017).

In order to test these hypotheses, in addition to the main variables of well-being and pro-environmental behavior, we include a set of control variables capturing respondents' personal information:

Income. The participants indicated their parents' monthly income by selecting one of the eight intervals given as an option, with the lowest category being less than €499 and the highest €5000 or more. We estimated the income for each category using the midpoint of the interval (except in the case of the top category, where we estimated it at €6000). We calculate per capita income dividing by the number of people living in the household. In the analysis we include the natural logarithm of these incomes.

Age. We consider the age in years specified by respondents. We also incorporate the variable age^2 .

Gender. Respondents indicated their gender by selecting male (1); female (2); or other (3).

Marital status. This variable comprises five categories: married (1); with a stable partner (2); divorced or separated (3); widowed (4); and single (5).

Relationships. The variable *relationships* reflects respondents' social life. They are asked about the frequency with which they are in touch with their relatives, friends and neighbors on a scale of 1 (never) to 5 (every day or almost every day). We calculate the variable as the average of the scores obtained in the three items (family, friends and neighbors).

Health. Individuals describe their health status by selecting one of the following categories: no problems (1); mild problems (2); moderate problems (3); and major problems (4).

Work. A dichotomous variable that indicates whether the respondent works (1) or not (0).

Area. This variable takes three values, depending on whether the participants live in a rural area/village (1); in an urban area, near a city (2); or in a city (3).

4.3.3 Method of analysis

To examine the relationship between pro-environmental behavior and well-being, we use a regression analysis, which allows us to determine both the nature and strength of the relationship between these two variables. We specify different models for each dimension of well-being, incorporating life satisfaction, emotions, and subjective vitality as dependent variables, in turn. For each model, we perform a series of regression analyses, including the proposed categories of behavior, one by one, as the predictor variable.

For the estimation of the parameters, we use Ordinary Least Squares (OLS). This is the most suitable method for the variables *emotions* and *vitality*, since they can be treated as cardinal variables. In contrast, given the ordinal nature of the variable *life satisfaction*, it would be more appropriate to use an ordered probit model. However, as in previous studies (e.g., Guillen-Royo, 2019; Verhofstadt et al., 2016), we apply OLS because its interpretation is simpler and the results obtained with these two methods are very similar (Ferrer-i-Carbonell & Frijters, 2004). In any case, we repeat the analyses referring to life satisfaction using ordered probit models, finding similar results. Data analysis was performed using Stata15 statistical software.

5.4 Results

First, we performed a descriptive analysis of the variables used in the regression analysis. Table 5.2 presents the descriptive statistics of these variables. With regard to ecological behavior, distinguishing according to the cost/benefit they involve, those that represent savings register the highest frequency, while those that

represent a monetary cost are the least common. On the other hand, actions that are not easily observed by others are more common than observable actions.

Table 5. 2. Descriptive statistics

	Mean/% ^a	Std. Dev.	Min	Max
Subjective well-being				
Life satisfaction	7.0319	1.6985	1	10
Emotions	7.9928	11.0438	-25	35
Vitality	3.3097	0.7389	1	5
Pro-environmental behavior (PEB)				
PEB cost-money	1.9399	0.9128	1	5
PEB cost-time	2.4657	0.8855	1	5
PEB saving	3.6739	0.6160	1.1429	5
PEB neutral	2.9049	1.0983	1	5
PEB observable	2.8223	0.7161	1	5
PEB non-observable	3.1014	0.6208	1	5
Control variables				
Income	6.1916	0.7967	3.2189	8.6995
Age	20.7040	2.8121	18	54
Gender (female)	62.28%		0	1
Marital status (single)	63.21%		0	1
Relationships	3.4813	0.7542	1	5
Work	25.49 %		0	1
Area (rural)	16.03%		0	1
Area (near a city)	16.96%		0	1
Area (city)	67.01%		0	1
Health (no problems)	53.55%		0	1
Health (mild problems)	37.31%		0	1
Health (moderate problems)	8.32%		0	1
Health (major problems)	0.82%		0	1

^a This column shows the mean of the quantitative variables, while for the qualitative variables it shows the percentage of individuals in the sample with that particular characteristic.

Next, we studied the relationship of the different types of actions with life satisfaction (Table 5.5), emotions experienced (Table 5.6) and vitality (Table 5.7). For each conception of well-being, we first analyzed the relationship with pro-environmental behaviors differentiated according to the cost/benefit for the individual who performs them (*a*). Secondly, we studied this relationship by distinguishing between behaviors according to the ease with which they are observed by third parties (*b*).

While some types of behavior are positively and significantly associated with the affective or eudaimonic dimensions of subjective well-being, the category of neutral behavior (actions that do not involve either a cost or a saving) is not associated with any dimension of well-being. In contrast, no behavior is significantly related to life satisfaction. The emotions experienced are related only to the behaviors that entail a saving ($b=0.941$, $p<0.1$). Subjective vitality is associated with behaviors that involve a cost, in terms of money ($b=0.0536$, $p<0.05$) and time ($b=0.0613$, $p<0.01$). Furthermore, it is related both to behaviors that are easily observed by others ($b=0.0666$, $p<0.05$), and to those that are not ($b=0.0759$, $p<0.05$). Therefore, we do not find differences between the type of behavior based on this last criterion. The rest of the relationships between subjective well-being and behaviors are nonsignificant.

Table 5.3. Life satisfaction and different types of pro-environmental behavior

	Life satisfaction					
	(a)			(b)		
PEB cost-money	-0.019 (0.062)					
PEB cost-time		-0.0724 (0.065)				
PEB saving			-0.0452 (0.096)			
PEB neutral				-0.0435 (0.047)		
PEB observable					-0.0517 (0.079)	
PEB non-observable						-0.102 (0.091)
Income	0.0978 (0.064)	0.0971 (0.064)	0.0952 (0.064)	0.095 (0.064)	0.0962 (0.064)	0.0931 (0.064)
Age	-0.0235 (0.064)	-0.0206 (0.064)	-0.0251 (0.065)	-0.0213 (0.064)	-0.0251 (0.065)	-0.0206 (0.064)
Age ²	0.000592 (0.00103)	0.000555 (0.00102)	0.000604 (0.00103)	0.000557 (0.00102)	0.000623 (0.00103)	0.000538 (0.00102)
Gender (female)	0.0754 (0.109)	0.0855 (0.109)	0.0796 (0.108)	0.0912 (0.110)	0.0819 (0.108)	0.0885 (0.108)
Marital status (single)	-0.454*** (0.106)	-0.457*** (0.106)	-0.454*** (0.106)	-0.460*** (0.106)	-0.456*** (0.106)	-0.457*** (0.106)
Relationships	0.360*** (0.072)	0.368*** (0.073)	0.358*** (0.072)	0.356*** (0.072)	0.363*** (0.073)	0.358*** (0.073)
Work	-0.0766 (0.128)	-0.0629 (0.129)	-0.0808 (0.128)	-0.0734 (0.128)	-0.0755 (0.128)	-0.0665 (0.128)
Area (near a city)	0.0103 (0.175)	0.00323 (0.175)	0.0117 (0.175)	0.00833 (0.175)	0.0108 (0.175)	0.00545 (0.175)
Area (city)	-0.0268 (0.144)	-0.0259 (0.144)	-0.0199 (0.145)	-0.0203 (0.144)	-0.0196 (0.145)	-0.0231 (0.144)
Health (mild problems)	-0.585*** (0.107)	-0.580*** (0.107)	-0.583*** (0.107)	-0.582*** (0.107)	-0.583*** (0.107)	-0.580*** (0.107)
Health (moderate problems)	-1.344*** (0.220)	-1.336*** (0.219)	-1.347*** (0.219)	-1.335*** (0.219)	-1.341*** (0.219)	-1.342*** (0.219)
Health (major problems)	-1.760*** (0.617)	-1.746*** (0.596)	-1.764*** (0.615)	-1.769*** (0.613)	-1.764*** (0.609)	-1.754*** (0.610)
Constant	6.059*** (1.047)	6.121*** (1.041)	6.231*** (1.153)	6.135*** (1.038)	6.179*** (1.073)	6.325*** (1.089)
F	9.84	9.9	9.87	9.86	9.85	9.92
R ²	0.12	0.121	0.12	0.12	0.12	0.121
N	973	973	973	973	973	973

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5.4. Emotions index and different types of pro-environmental behavior

	Emotions					
	a)			b)		
PEB cost-money	0.305 (0.391)					
PEB cost-time		0.344 (0.386)				
PEB saving			0.941* (0.570)			
PEB neutral				0.272 (0.320)		
PEB observable					0.754 (0.506)	
PEB non-observable						0.427 (0.562)
Income	0.957** (0.432)	0.959** (0.431)	1.014** (0.430)	0.974** (0.431)	0.980** (0.430)	0.976** (0.431)
Age	0.0162 (0.439)	-0.00392 (0.438)	0.0521 (0.437)	-0.00307 (0.439)	0.039 (0.438)	-0.00252 (0.439)
Age ²	0.00448 (0.007)	0.00488 (0.007)	0.00413 (0.007)	0.0049 (0.007)	0.00406 (0.007)	0.00495 (0.007)
Gender (female)	-1.631** (0.711)	-1.676** (0.709)	-1.720** (0.709)	-1.728** (0.715)	-1.725** (0.710)	-1.683** (0.709)
Marital status (single)	-1.323* (0.717)	-1.315* (0.718)	-1.322* (0.714)	-1.294* (0.721)	-1.291* (0.717)	-1.318* (0.718)
Relationships	2.932*** (0.470)	2.908*** (0.469)	2.956*** (0.466)	2.968*** (0.468)	2.893*** (0.469)	2.957*** (0.467)
Work	0.13 (0.856)	0.106 (0.854)	0.2 (0.848)	0.146 (0.850)	0.119 (0.850)	0.131 (0.853)
Area (near a city)	-0.702 (1.228)	-0.67 (1.230)	-0.73 (1.227)	-0.691 (1.228)	-0.709 (1.227)	-0.684 (1.229)
Area (city)	0.41 (0.916)	0.416 (0.915)	0.26 (0.925)	0.378 (0.921)	0.306 (0.921)	0.405 (0.917)
Health (mild problems)	-3.792*** (0.716)	-3.817*** (0.716)	-3.829*** (0.715)	-3.811*** (0.715)	-3.819*** (0.716)	-3.815*** (0.716)
Health (moderate problems)	-5.772*** (1.363)	-5.777*** (1.356)	-5.734*** (1.359)	-5.802*** (1.359)	-5.824*** (1.358)	-5.746*** (1.357)
Health (major problems)	-12.98*** (3.583)	-13.04*** (3.643)	-12.89*** (3.663)	-12.92*** (3.638)	-12.92*** (3.703)	-13.00*** (3.604)
Constant	-7.357 (6.919)	-7.271 (6.855)	-11.09 (7.115)	-7.501 (6.846)	-9.064 (6.962)	-8.075 (6.907)
F	9.75	9.73	10.14	9.73	9.89	9.8
R ²	0.115	0.115	0.117	0.115	0.117	0.115
N	973	973	973	973	973	973

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5.5. Vitality and different types of pro-environmental behavior

	Vitality					
	a)			b)		
PEB cost-money	0.0536** (0.0269)					
PEB cost-time		0.0611** (0.0256)				
PEB saving			0.0616 (0.0395)			
PEB neutral				0.0162 (0.0207)		
PEB observable					0.0666** (0.0321)	
PEB non-observable						0.0759** (0.0368)
Income	0.0541* (0.0278)	0.0546** (0.0278)	0.0577** (0.0278)	0.0550** (0.0279)	0.0561** (0.0278)	0.0575** (0.0277)
Age	0.0551** (0.0275)	0.0516* (0.0276)	0.0565** (0.0276)	0.0529* (0.0276)	0.0563** (0.0276)	0.0518* (0.0275)
Age ²	-0.00075* (0.0004)	-0.000675 (0.0004)	-0.00073* (0.0004)	-0.00068 (0.0004)	-0.00076* (0.0004)	-0.00066 (0.0004)
Gender (female)	-0.0507 (0.0469)	-0.0588 (0.0467)	-0.0561 (0.0468)	-0.0561 (0.0474)	-0.0588 (0.0469)	-0.06 (0.0466)
Marital status (single)	-0.0276 (0.0456)	-0.0262 (0.0456)	-0.029 (0.0456)	-0.0274 (0.0459)	-0.0259 (0.0456)	-0.0267 (0.0456)
Relationships	0.293*** (0.0322)	0.289*** (0.0318)	0.297*** (0.0318)	0.298*** (0.0319)	0.292*** (0.0321)	0.298*** (0.0317)
Work	0.0172 (0.0504)	0.0127 (0.0508)	0.0282 (0.0504)	0.0249 (0.0501)	0.0213 (0.0505)	0.0172 (0.0504)
Area (near a city)	-0.111 (0.0767)	-0.106 (0.0766)	-0.113 (0.0768)	-0.111 (0.077)	-0.112 (0.0767)	-0.108 (0.0767)
Area (city)	-0.0518 (0.0618)	-0.0507 (0.0617)	-0.0599 (0.0633)	-0.052 (0.0623)	-0.0596 (0.0627)	-0.0526 (0.0619)
Health (mild problems)	-0.226*** (0.0472)	-0.231*** (0.0473)	-0.229*** (0.0474)	-0.228*** (0.0474)	-0.229*** (0.0473)	-0.231*** (0.0474)
Health (moderate problems)	-0.417*** (0.0838)	-0.418*** (0.0838)	-0.409*** (0.0842)	-0.413*** (0.0833)	-0.417*** (0.0844)	-0.412*** (0.0835)
Health (major problems)	-0.682*** (0.184)	-0.693*** (0.188)	-0.676*** (0.184)	-0.678*** (0.185)	-0.676*** (0.184)	-0.686*** (0.189)
Constant	1.258*** (0.444)	1.272*** (0.439)	1.073** (0.467)	1.312*** (0.437)	1.154*** (0.446)	1.129** (0.447)
F	15.51	15.33	15.06	14.98	15.31	15.11
R ²	0.164	0.165	0.162	0.16	0.164	0.164
N	973	973	973	973	973	973

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In summary, the results obtained only partially support the first hypothesis formulated above: in general, more frequent participation in pro-environmental behavior is positively related only to the affective and eudaimonic dimensions of subjective well-being, whereas it is not significant for the cognitive dimension. The findings are consistent with hypotheses 2 and 3: the relationship between pro-environmental behavior and well-being differs according to the type of behavior and the dimension of well-being considered.

5.5 Discussion

Several studies have concluded that caring for the environment and improving people's well-being are compatible goals. A growing body of empirical evidence on this has strengthened the double dividend theory: being environmentally responsible results in a benefit both for the environment and for people's well-being (Jackson, 2005). However, the empirical evidence in this research does not universally reproduce the existence of the double dividend. While the theory may hold true for the scenario under study, the challenge arises of extending the double dividend to all scenarios. The results of this study underline the importance of the concept of well-being and the type of behavior taken into account, and call for further research on different specific scenarios, which could shape policies aiming to create a double dividend.

As an analysis strategy, we applied two different categorizations of pro-environmental actions: firstly, differentiating according to the cost/benefit for the individual who performs them; and secondly, according to the ease with which these behaviors are observed by third parties. In the first part of the analysis, we find that saving behaviors are positively related to the emotions experienced, while cost behaviors are positively associated with subjective vitality. The behaviors that do not entail either a cost or savings are not related to any dimension of well-being. In the second part of the analysis, which considers whether or not behaviors are observed by third parties, we find no differences, as both types are related only to subjective vitality. The fact that a behavior can be easily observed by others does not seem to have any effect on the relationship between sustainable behavior and well-being.

These results have two implications for the theory of the well-being dividend that merit discussion. Firstly, the evidence that saving behaviors are positively related to the affective dimension of well-being supports the theory. In this regard, this evidence is in accordance with some past research, with particular differences regarding the well-being dimension under consideration. Previous studies have found a positive relationship between saving behaviors and happiness (Gokdemir, 2015; Guven, 2012). The results concerning costly behaviors are in line with those obtained by Schmitt et al. (2018), in that it seems that such behaviors have a stronger (positive) relationship with well-being than those that do not involve cost. However, the associations they found were with life satisfaction, while ours are for subjective vitality. More costly behaviors may be more strongly related to well-being because they may be perceived as more effective in helping the environment (Schmitt et al., 2018).

The second implication with respect to this theory refers to specific non-significant relationships we have found between well-being and sustainable behavior. We found no significant positive associations between life satisfaction and pro-environmental behavior, unlike several previous studies (Brown & Kasser, 2005; Kaida & Kaida, 2016; Xiao & Li, 2011). However, this finding is not entirely new in the literature. Some previous research has already found nonsignificant and even negative relationships with life satisfaction (Binder et al., 2020; Ibáñez-Rueda et al., 2020; Suarez-Varela et al., 2014; Verhofstadt et al., 2016). In this respect, a possible explanation can be drawn from the role of pro-environmental values as a social norm. Welsch and Kühling (2018) found that part of the well-being benefit of holding pro-environmental values derives from compliance with a shared social norm. Perhaps greater unanimity in pro-environmental attitudes is needed to benefit from increased life satisfaction through environmentally-responsible behavior. Furthermore, the possibility that individuals do not see sustainable behaviors as a well-established social norm may also explain why no differences have been found between behaviors that are easily observed by others and those that are not. However, this is left as a hypothesis for further research, as we could not test it in the present study.

In our view, we do not think that our evidence invalidates the existence of the well-being dividend. Rather, it raises the possibility that it may be not present in certain groups. Further research would shed light on whether it can be reinforced through political proposals such as educational programs. Future research should also consider different social groups and classes, different cultures, the presence of social norms, the specific characteristics of individuals, behavioral characteristics, or different well-being conceptions. The last two factors seem relevant in view of our results, although they merit further exploration, and alternative factors should be considered. To this end, it would be advisable to reproduce this study with samples from other countries and covering a more diverse population, not limited to students. The latter aspect is especially interesting for the existing evidence. As Binder et al. (2020) argue, students are generally characterized by low income and some studies have pointed out that disposable income could affect the performance of certain pro-environmental actions (Clark et al., 2003; Stern et al., 1999; Zorić & Hrovatin, 2012). In addition, it might also be interesting to consider a wider selection of pro-environmental actions.

Finally, it should be noted that one of the main limitations of the results obtained is that they can only be interpreted as an association, and thus do not allow us to establish a cause-effect relationship. Therefore, the relationship between the two concepts studied may go in either direction.

5.6 Conclusion

In this research, we have examined the relationship between pro-environmental behavior and subjective well-being, exploring whether the positive associations found by previous research extend to different types of behavior and conceptions of well-being. Using regression analysis with data from a sample of students from the University of Granada, Spain, we found that the relationship between pro-

environmental behavior and well-being differs according to the type of behavior and the dimension of well-being considered. More frequent participation in pro-environmental behavior is positively related only to the affective (experienced emotions) and eudaimonic (subjective vitality) dimensions of well-being. We did not find significant associations between any type of pro-environmental behavior and life satisfaction. In relation to the cost/benefits of the behaviors, we found that actions that involve saving money are positively related to emotions, while actions that involve a cost, in terms of money and time, are positively related to subjective vitality. In contrast, we found no association with well-being for behaviors that entail no cost or benefit to the individual who performs them. As regards their relationship with subjective well-being, we did not find differences between behaviors that are easily observable by third parties and those that are not, with both being positively related to subjective vitality. Despite some exceptions, the well-being dividend theory is still supported by empirical results from numerous studies. However, our particular results raise the possibility that some political actions are needed to link happiness and sustainability in particular contexts. Future research is faced with the task of identifying those specific scenarios and finding out why the theory does not hold there.

ACKNOWLEDGEMENTS

The authors acknowledge the financial support from the Spanish Agencia Estatal de Investigación and the European Regional Development Fund (Project ECO2017-86822-R); the Regional Government of Andalusia and the European Regional Development Fund (Projects P18-RT-576 and B-SEJ-018-UGR18) and the University of Granada (Plan Propio. Unidad Científica de Excelencia: Desigualdad, Derechos Humanos y Sostenibilidad -DEHUSO-).

References

- Binder, M., & Blankenberg, A. K. (2016). Environmental concerns, volunteering and subjective well-being: Antecedents and outcomes of environmental activism in Germany. *Ecological Economics*, *124*, 1-16.
- Binder, M., & Blankenberg, A. K. (2017). Green lifestyles and subjective well-being: More about self-image than actual behavior? *Journal of Economic Behavior & Organization*, *137*, 304-323.
- Binder, M., Blankenberg, A. K., & Guardiola, J. (2020). Does it have to be a sacrifice? Different notions of the good life, pro-environmental behavior and their heterogeneous impact on well-being. *Ecological Economics*, *167*, 106448.
- Brown, K.W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Social Indicators Research*, *74*(2), 349-368.
- Clark, C. F., Kotchen, M. J., & Moore, M. R. (2003). Internal and external influences on pro-environmental behavior: Participation in a green electricity program. *Journal of Environmental Psychology*, *23*(3), 237-246.
- Diener, E., Lucas, R. E., & Oishi, S. (2002). Subjective well-being: The science of happiness and life satisfaction. In C. R. Snyder, & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 63-73). Oxford University Press.
- Dolan, P., Layard, R., & Metcalfe, R. (2011). *Measuring subjective wellbeing for public policy: Recommendations on measures (No. 23)*. Centre for Economic Performance, LSE.
- Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology*, *29*(1), 94-122.
- Ferrer-i-Carbonell, A., & Frijters, P. (2004). How important is methodology for the estimates of the determinants of happiness? *The Economic Journal*, *114*, 641-659.
- Gokdemir, O. (2015). Consumption, savings and life satisfaction: The Turkish case. *International Review of Economics*, *62*, 183-196.
- Graham, C., & Nikolova, M. (2015). Bentham or Aristotle in the development process? An empirical investigation of capabilities and subjective well-being. *World Development*, *68*(1), 163-179.

Guillen-Royo, M. (2010). Realising the “wellbeing dividend”: An exploratory study using the Human Scale Development approach. *Ecological Economics*, 70(2), 384-393.

Guillen-Royo, M. (2019) Sustainable consumption and wellbeing: Does on-line shopping matter? *Journal of Cleaner Production*, 229, 1112-1124.

Guillen-Royo, M., Guardiola, J., & Garcia-Quero, F. (2017). Sustainable development in times of economic crisis: A needs-based illustration from Granada (Spain). *Journal of Cleaner Production*, 150, 267-276.

Guyen, C. (2012). Reversing the question: Does happiness affect consumption and savings behavior? *Journal of Economic Psychology*, 33(4), 701-717.

Ibáñez-Rueda, N., Guillén-Royo, M., & Guardiola, J. (2020). Pro-environmental behavior, connectedness to nature, and wellbeing dimensions among Granada students. *Sustainability*, 12(21), 9171.

Jackson, T. (2005). Live better by consuming less? Is there a double dividend in sustainable consumption? *Journal of Industrial Ecology*, 9(1-2), 19-36.

Kaida, N., & Kaida, K. (2016). Pro-environmental behavior correlates with present and future subjective well-being. *Environment, Development and Sustainability*, 18(1), 111-127.

Kasser, T. (2017). Living both well and sustainably: A review of the literature, with some reflections on future research, interventions and policy. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 375(2095), 20160369.

Martin, L., White, M., Hunt, A., Richardson, M., Pahl, S., & Burt, J. (2020). Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviours. *Journal of Environmental Psychology*, 68, 101389.

O'Brien, C. (2008). Sustainable happiness: How happiness studies can contribute to a more sustainable future. *Canadian Psychology/Psychologie canadienne*, 49(4), 289-295. <https://doi.org/10.1037/a0013235>

Rojas, M., & Guardiola, J. (2017). Hunger and the experience of being well: Absolute and relative concerns, *World Development*, 96, 78-86.

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, 52(1), 141-166.

Ryan, R. M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, 65(3), 529-565.

Schmitt, M. T., Akin, L. B., Axsen, J., & Shwom, R. L. (2018). Unpacking the relationships between pro-environmental behavior, life satisfaction, and perceived ecological threat. *Ecological Economics*, 143, 130-140.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309-317.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, 6(2), 81-97.

Suárez-Varela, M., Guardiola, J., & González-Gómez, F. (2014). Do pro-environmental behaviors and awareness contribute to improve subjective well-being? *Applied Research in Quality of Life*, 11(2), 429-444. <https://doi.org/10.1007/s11482-014-9372-9>

Ulluwishewa, R. (2016). Spirituality, sustainability and happiness: A Quantum-neuroscientific perspective. In S. Dhiman, & J. Marques (Eds.), *Spirituality and sustainability: New horizons and exemplary approach* (pp. 155-168). Springer.

Verhofstadt, E., Van Ootegem, L., Defloor, B., & Bleys, B. (2016). Linking individuals' ecological footprint to their subjective well-being. *Ecological Economics*, 127, 80-89.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070.

Welsch, H., & Kühling, J. (2018). How green self image is related to subjective well-being: Pro-environmental values as a social norm. *Ecological Economics*, 149, 105-119.

Xiao, J.J., & Li, H. (2011). Sustainable consumption and life satisfaction. *Social Indicators Research*, 104(2), 323-329.

Zawadzki, S. J., Steg, L., & Bouman, T. (2020). Meta-analytic evidence for a robust and positive association between individuals' pro-environmental behaviors and their subjective wellbeing. *Environmental Research Letters*, 15, 123007.

Zorić, J., & Hrovatin, N. (2012). Household willingness to pay for green electricity in Slovenia. *Energy Policy*, 47, 180-187.