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ON WELL-BEING**

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Does it have to be a sacrifice? Different notions of the good life, pro-environmental behavior and their heterogeneous impact on well-being[☆]

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Abstract

Our well-being is influenced by our notion of what constitutes a good life, a vital part of our identity. While pro-environmental behavior is often found to be positively related to individuals' well-being, our research delves into the extent to which this relationship is influenced by individuals' identity, measured both as green self-image and their notion of the good life in general. Using survey responses from Spanish university students ($n = 640$) and paying close attention to the subjective perception of what it means to be "satisfied with their lives", we find that green behavior is negatively related to life satisfaction in our sample. In contrast, green self-image is positively related to life satisfaction. Whether pro-environmental behavior is positively related to life satisfaction further depends on whether one's notion of the good life (and hence happiness) is utopian, stoicist, or based on a fulfillment- or virtue-view. In addition, well-being loss from pro-environmental behavior also decreases with the available disposable income.

Key words: Pro-environmental behavior, subjective well-being, good life, identity, green self-image, conceptual referent theory, life satisfaction

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1. Introduction

Our perceptions shape our world. For the hedonist, conserving energy and avoiding wasteful consumption might be a sacrifice, impacting negatively on their well-being. But for someone striving to be virtuous, saving the planet would be perceived as something that increases well-being, even despite having to cut back on consumption.

Research has shown the association of pro-environmental behavior with higher subjective well-being (e.g., [Brown and Kasser, 2005](#); [Welsch and Kühling, 2010](#); [Xiao and Li, 2011](#); [Kasser, 2017](#)), but not all studies show this uniformly across samples or types of behavior (e.g., [Suárez-Varela et al., 2016](#)). To explain why pro-environmental behavior could be beneficial, the study of pro-social motivations or value orientations has been suggested ([Kasser, 2006](#); [Hurst et al., 2013](#)). This points to a broader explanation in terms of individuals' identity as playing an important role for pro-environmental behavior ([Whitmarsh and O'Neill, 2010](#)) and a small number of studies also suggest that it may rather be green self-image (not so much green behavior itself) that can account for the well-being gain ([Binder and Blankenberg, 2017](#); [Welsch and Kühling, 2018](#)).

Our identity, who we are, determines what we do and how we perceive and experience our actions. This paper contributes to the literature by exploring the extent to which the relationship between pro-environmental behavior and subjective well-being is influenced by individuals' identity, measured narrowly as green self-image and more broadly with regard to their notion of the good life in general. Drawing on theories of identity ([Biddle et al., 1987](#); [Sparks and Shepherd, 1992](#); [Whitmarsh and O'Neill, 2010](#); [Akerlof and Kranton, 2010](#); [Steg, 2015](#)) and building on conceptual referent theory ([Rojas, 2005, 2007](#)), we are amongst the first to pay empirically close attention to the fact that different individuals might understand different things by being "satisfied with their lives", for instance linking happiness to leading a virtuous or fulfilled life. We use an original data set of Spanish students (from the University of Granada) to analyze how green behavior and subjective well-being vary for self-proclaimed hedonists, stoics, virtue ethicists and more. While these notions relate to the well-known distinction between intrinsic and extrinsic motivations (e.g., [Kasser, 2017](#)), conceptual referent theory allows us to unpack this distinction further by specifying more precisely the ways in which individuals perceive a good life, arguably a central part of their

personal identity.

Contrary to our expectations, we find that higher levels of pro-environmental behavior are associated with lower life satisfaction in our sample of Spanish students. This negative association decreases in income available. On the other hand, having a greener self-image is robustly related to higher life satisfaction irrespective of actual green behavior. While we do not find many well-being differences on comparing notions of the good life with the reference category in general (only utopians are significantly less satisfied with their lives), different notions of the good life interact differently with green behavior regarding their impact on life satisfaction: stoics have lower well-being when doing nothing for the environment and their life satisfaction increases with greener behavior. Respondents subscribing to a fulfillment- or tranquility-based view of well-being, on the other hand, have higher life satisfaction when being environmentally unfriendly: the more pro-environmental behaviors they commit to, the lower their well-being. By unpacking green behavior and identity this way, we contribute to better understanding the forces of self-selection at play that likely govern the relationship between pro-environmental behavior and subjective well-being.

Our paper is structured as follows. The subsequent section 2 discusses the theoretical framework that informs our analyses. We then provide an overview of our unique data set in Section 3. Section 4 presents our results and Section 5 explores their robustness. Section 6 concludes and discusses the limitations of our study.

2. Literature background

The starting point of our analysis is that a growing literature provides evidence that acting in pro-environmental ways carries a subjective well-being (SWB) dividend (Kasser, 2017):¹ different pro-environmental behaviors (PEBs) are typically associated with higher satisfaction with life in various samples (Kasser and Sheldon, 2002; Brown and Kasser, 2005; Jacob et al., 2009; Welsch and Kühling, 2010, 2011; Xiao and Li, 2011; Laffan, 2017; Schmitt

¹Subjective well-being (or colloquially “happiness”) is usually measured via questions relating to individuals’ life satisfaction, i.e. “Taking all things together, how satisfied or dissatisfied are you currently with your life as a whole”. While seemingly simplistic, the validity and reliability of these measures have been confirmed time and again (Lucas, 2018) and a burgeoning literature on the determinants of individuals’ subjective well-being has bloomed (Dolan et al., 2008; Layard et al., 2012; Graham, 2009).

et al., 2018). However, there are exceptions to this, such as [Suárez-Varela et al. \(2016\)](#), who only find mixed evidence in their cross-sectional Spanish sample, with installing water-saving devices being positively related to SWB but other green behaviors not being significantly related. Such heterogeneity also extends to the studies cited above, where different studies use different PEBs –not all PEBs are consistently related to SWB across studies– and samples are drawn from different backgrounds, varying from broader samples for the US or German population ([Welsch and Kühling, 2011](#); [Brown and Kasser, 2005](#)) to a sample of members of a Buddhist fellowship ([Jacob et al., 2009](#)). Two studies also draw on student samples ([Kasser and Sheldon, 2002](#); [Brown and Kasser, 2005](#)) and find a positive association between acting pro-environmentally and SWB. Existing research thus gives us no indication that the students’ experience of a well-being gain from pro-environmental behavior would vary from that of participants in other samples. Students might, however, be more concerned with the environment than those from other samples, yet they have been also shown –at the same time– to act less pro-environmentally than non-students, potentially due to the monetary costliness of some PEBs (although the evidence on age differences in general is decidedly inconclusive, see [Grønhøj and Thøgersen, 2012](#); [Gifford and Nilsson, 2014](#); [Wiernik et al., 2013](#)).²

Pro-social motivations have been used to explain the positive benefits of pro-environmental behaviors in previous work ([Stern et al., 1999](#); [Stern, 2000](#); [Videras and Owen, 2006](#); [Helliwell, 2014](#); [Binder and Blankenberg, 2016](#)), as a positive well-being dividend would seem to run counter to standard economic theory (curbing consumption would decrease utility if defined over a set of consumer goods, as would incurring a direct cost in terms of money or time from conservation efforts; [Jackson, 2005](#)). Other explanations are conceivable too, such as the social element inherent in some environmental activities when done together or in highly visible ways ([Schmitt et al., 2018](#)).³ Most relevant for the present context are,

²While our empirical analysis uses a student sample, our literature background in most parts does not focus on students specifically. Apart from the fact that the PEB-SWB relationship has been found in all types of samples, our choice to not focus specifically on students in the literature review is also due to the fact that there is no literature on notions of the good life or green self-image of students (with regard to their association with SWB), but also on the implicit assumption that our analysis and findings will generalize beyond the student context. We will discuss issues of external validity in more detail in Section 6.

³Such social factors also show when it comes to “conspicuous greenness” that entails status utility not

however, studies that relate the well-being gain to individuals' values and identity.

Identity (or synonymously “self-image”, “self-identity”) can be broadly defined as “a person’s sense of self” (Akerlof and Kranton, 2000, p. 715) or the “label[s] used to describe oneself” (Sparks and Shepherd, 1992; Whitmarsh and O’Neill, 2010, p. 306). The literature then more narrowly distinguishes “social” (identification of self with a group), “personal” (identification in terms of unique traits) and “self-identity” (identification in terms of roles or behaviors), with the boundaries between the notions often not clearly distinguishable and contested (Terry et al., 1999; Terry and Smith, 2008; McKendree, 2010). For our purpose, and in a broad sense, identity refers to a person’s system of values, goals and beliefs (Van der Werff et al., 2013; Gatersleben et al., 2014; Steg, 2015), where one’s values are an especially central core component of identity (Gatersleben et al., 2014, p. 378). Where one’s values are more abstract principles that guide behavior, identity is the mediating factor between the two. And one’s values provide the stable basis for one’s identity (Crompton and Kasser, 2010; Van der Werff et al., 2013). But identity is a narrative that is influenced not only by one’s values but also by personal motivations (e.g. satisfaction of the need for self-esteem) or by social factors such as expectations of others (expressed for instance in norms). While it is not implausible to assume that one’s identity evolves over time and through learning and social interaction, its grounding in core individual values makes quick changes to identity implausible.⁴ Identity both serves to differentiate oneself from others as well as conform to the values and beliefs of other social groups (Whitmarsh and O’Neill, 2010, p. 306). Our identity is thus shaped in parts through social interaction and subsequently determines actions and how we perceive the world (Biddle et al., 1987).

Identity theories may either stress the social group element, where social identity is defined as “that part of the individuals’ self-concept which derives from their knowledge of their

related to pro-social motivations (Sexton and Sexton, 2014; Welsch and Kühling, 2016). However, such status consumption might ultimately be self-defeating in terms of well-being gains as it would give rise to the well-known treadmill dynamics associated with positional goods.

⁴There may not be one identity, however, but rather multiple identities, which are activated in different social contexts (Akerlof and Kranton, 2010), for instance our identity at work may be that of a nurse or a professor and encompass values and actions different from those lived outside of work. While this might be relevant for green self-image, it seems somewhat less plausible to assume people hold different notions of the good life at different times, depending on the social identity activated. But that does not mean that people’s notion of the good life cannot evolve over time (compare for instance Piaget’s stages of moral development).

membership of a social group (or groups) together with the value and emotional significance of that membership” (Tajfel, 1981, p. 255) or focus more on personal or self-identity (in the meanings defined above): a person’s self-concept not directly related to social group membership. In economics, the notion of identity has been mostly used as social identity, i.e. with respect to norms and social group memberships shaping individuals’ behavior and well-being (Akerlof and Kranton, 2000, 2010).

Studies analyzing identity and pro-environmental behavior mostly focus on green self-image and its importance for behavior (Biddle et al., 1987; Whitmarsh and O’Neill, 2010). While it is well-known that PEBs themselves are driven by subjective factors such as environmental concerns (McCright and Xiao, 2014; Binder and Blankenberg, 2016; Nauges and Wheeler, 2017) and green identity (Whitmarsh and O’Neill, 2010; Owen et al., 2010; Sexton and Sexton, 2014; Gatersleben et al., 2014; Barbarossa et al., 2017), researchers have only started to pay sufficient attention to the possibility that subjective perceptions of the world might also drive the well-being gain resulting from green behavior. In this vein, a positive association between intrinsic motivations (Kasser, 2006) as well as non-materialistic attitudes (Hurst et al., 2013; Delhey, 2010; Pandelaere, 2016; Kashdan and Breen, 2007; Dittmar et al., 2014) and subjective well-being has been established. More directly, green self-image (“leading a green lifestyle”) has been associated with higher life satisfaction across a sample of EU countries (Welsch and Kühling, 2018) and in a UK sample (Binder and Blankenberg, 2017). The latter study also found that the PEB impact on well-being came from green self-image, whereas actual green behaviors were not associated with well-being once adjusting for green self-image.

As the above exposition should have made clear, identity is broader than just referring to one’s green self-image, and our paper contributes to the literature by linking identity more closely to the notion of subjective well-being. Subjective well-being is usually understood to refer to a general positive attitude towards one’s life and/or positive emotions, viz. people “either describe it as often being in a state of joy, or as a state of satisfaction. The first is an emotion, the second a cognition, the result of reflection” (Argyle, 2013, p. 77). But what people mean when they rate themselves answering a subjective well-being question will likely also depend on their notion of the good life, a basic part of one’s personal identity

and core values. According to the “Conceptual Referent Theory of Happiness” (CRT), [Rojas \(2005\)](#) proposes that the perception of happiness and its determinants is influenced by the way in which a person defines happiness (its conceptual referent). This conceptual referent then again is influenced by cultural, social and other upbringing factors ([Rojas and Vittersø, 2010](#), show that notions of the good life may differ between countries). Not only does “high well-being” thus construed might mean different things to different people, the importance of different determinants of well-being might differ between those conceptual referents ([Rojas, 2005, 2007](#)). In this vein, someone subscribing to a virtue-based definition of happiness might derive different amounts of well-being from PEBs as opposed to someone subscribing to an enjoyment-based definition. Based on an analysis of philosophical literature, [Rojas \(2005\)](#) suggests eight different notions of the good life (as depicted in Table 1): Stoicism, Virtue, Utopian, Tranquility, Fulfillment, Satisfaction, Carpe Diem and Enjoyment. Accordingly, happiness could be seen as “accepting things as they are (Stoicism)”, “a sense of acting properly in our relationships with others and with ourselves (Virtue)”, “an unreachable ideal we can only try to approach (Utopian)”, “living a tranquil life, not looking beyond what is attainable (Tranquility)”, “fully exercising our capabilities (Fulfillment)”, “being satisfied with what I have and what I am (Satisfaction)”, “to seize every moment in life (Carpe Diem)”, or “to enjoy what one has attain[ed] in life (Enjoyment)” ([Rojas, 2005](#)). Related to the distinction of an intrinsic vs. extrinsic motivation ([Kasser, 2006](#)), [Rojas \(2007\)](#) divides these concepts further into being associated with an inner orientation (stoicism, virtue, utopian), somewhat inner orientation (tranquility), somewhat outer orientation (carpe diem, fulfillment) and outer orientation (enjoyment, satisfaction) of individuals. An inner orientation emphasizes the role of a person’s inner (internal) factors in their pursuit of happiness, while an outer orientation refers to a person’s external factors in pursuing happiness. While the heterogeneity of different notions of the good life with respect to the fundamental determinants of well-being is ill-researched, [Rojas \(2007\)](#) has shown, for instance, that income varies in its impact on subjective well-being depending on the conceptual referent one subscribes to. This is in line with findings that income is more relevant for life satisfaction for those who are more extrinsically oriented ([Georgellis et al., 2009](#)).

Based on our review of pertinent literature, we would expect (1) a positive relation-

Conceptual Referent	Descriptive sentence	Orientation
Stoicism	Happiness is accepting things as they are	Inner
Virtue	Happiness is a sense of acting properly in our relationships with others and with ourselves	Inner
Utopian	Happiness is an unreachable ideal we can only try to approach	Inner
Tranquility	Happiness is in living a tranquil life, not looking beyond what is attainable	Somewhat inner
Fulfilment	Happiness is in fully exercising our capabilities	Somewhat outer
Satisfaction	Happiness is being satisfied with what I have and what I am	Outer
Carpe Diem	Happiness is to seize every moment in life	Somewhat outer
Enjoyment	Happiness is to enjoy what one has attain[ed] in life	Outer

Table 1: Conceptual Referent Theory: Notions of the good life (adapted from (Rojas, 2005)).

ship between pro-environmental behavior and subjective well-being, as well as (2) a positive relationship between green self-image and subjective well-being, where green self-image potentially moderates the PEB-SWB relationship. With regard to our main research focus, viz. (3) the relationship between notions of the good life and subjective well-being, and how they moderate the PEB-SWB relationship, we cannot draw on previous studies to form hypotheses and no clear predictions exist apart from the expectation that notions of the good life closely related to intrinsic motivations would likely benefit well-being, whereas this is not the case for extrinsic motivations. Our study is thus exploratory in nature and should be read as thus.

3. Data and descriptive statistics

For the present analysis, we conducted a survey amongst students of the University of Granada in fall 2017. The students filled out a questionnaire during a single class period on a voluntary basis. The questionnaire was distributed to 857 students in 25 classes (accessible online via Qualtrics). They did not receive any payment for participation or any credits. The responses were collected from October through November 2017. Our sample consists of 819 students after the elimination of one questionnaire with clearly nonsensical answers and 37 unfilled questionnaires (a response rate of 96%). After cleaning the data set and deleting observations that did not contain the variables used in the analysis, our sample size dropped to lower than 800 students, with around 640 observations in our main models.

Our four main variables of interest are subjective well-being, a variable denoting the respondent’s classification in terms of notions of the good life (conceptual referents for the well-being variable) as well as green behavior and identity variables. We further use a rather standard set of control variables, to be discussed in the following. An overview with descriptive statistics of the sample is provided in Table 2.

	mean/%	sd	min	max	count
Life satisfaction	7.06	1.86	0	10	794
Notions of the good life					
Stoicism	0.02		0	1	793
Virtue	0.07		0	1	793
Utopian	0.13		0	1	793
Tranquility	0.01		0	1	793
Fulfillment	0.08		0	1	793
Satisfaction	0.36		0	1	793
Carpe diem	0.21		0	1	793
Enjoyment	0.11		0	1	793
Green behavior and self-image					
PEB index (mean)	2.07	0.48	0.65	3.58	779
GSI index (mean)	3.48	0.91	0.20	6	761
Active in env. organisation (0/1)	0.07		0	1	755
Control variables					
Monthly available money (“income”)	388.54	743.38	0	10010	696
Log (available money+1)	5.36	1.15	0	9.21	696
Living with parents (0/1)	0.60		0	1	736
Gender (female)	0.62		0	1	747
Age	20.65	4.81	16	88	742
Age ²	4.49	4.14	2.56	77.4	742
Health status	4.46	0.70	1	5	733
Social life: neighbours	3.17	1.30	1	5	744
Social life: friends	4.44	0.71	1	5	744
Marital status					
Married	0.04		0	1	733
Stable relationship	0.33		0	1	733
Divorced/separated	0.02		0	1	733
Widowed	0.01		0	1	733
Single	0.61		0	1	733
Area of study					
Economics	0.17		0	1	739
Psychology	0.00		0	1	739
Politics/law	0.09		0	1	739
Pedagogy	0.03		0	1	739
Statistics/math	0.06		0	1	739
Marketing	0.14		0	1	739
Business	0.10		0	1	739
Finance/accounting	0.06		0	1	739
HRM	0.19		0	1	739
Other	0.16		0	1	739
Area of studies: business/econ/finance (0/1)	0.47		0	1	739
Personality Traits, Big Five					
Openness	14.91	3.85	3	21	739
Conscientiousness	13.80	2.93	3	21	737
Extraversion	14.31	3.99	3	21	736
Agreeableness	15.61	2.99	4	21	735
Neuroticism	14.60	4.03	3	21	737

Table 2: Summary statistics for our sample. Variables are discussed in more detail in Section 3. Source: Authors’ own data set.

Subjective well-being is conceptualized as satisfaction with life and measured via the question “Please choose the number which you feel best describes how dissatisfied or satisfied you are with the following aspects of your current situation . . . Your life overall”. Respondents are asked to answer the question on a 11 point Likert scale (which ranges from 0=“completely

dissatisfied” up to 10=“completely satisfied”). Such a single-item question has desirable psychometric properties and is a valid and reliable measure of individual well-being (Lucas, 2018; Krueger and Schkade, 2008). We use ordered probit analysis to account for the possibility that the underlying variable is not cardinal, but acknowledge that results are very similar when estimating OLS models (which is often done in the literature, see also Ferrer-i Carbonell and Frijters, 2004). The upper-left panel of Figure 1 shows the distribution of life satisfaction scores in our sample, which is slightly left-skewed and in accordance with expectations.

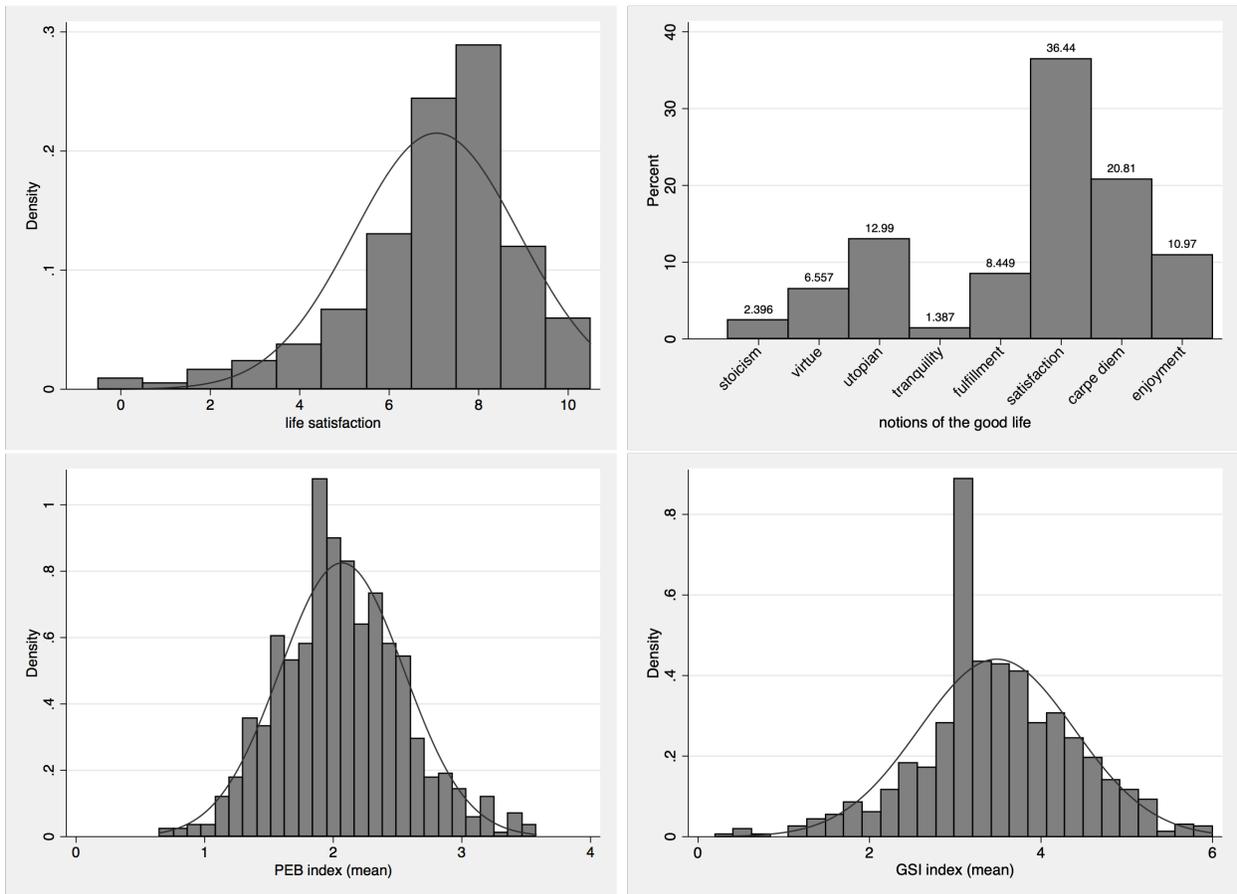


Figure 1: Histogram of life satisfaction and notions of the good life, green behavior index and green self-image index.

To further unpack what people mean when responding to such life satisfaction questions, we asked them about the conceptual referent in the happiness question (Rojas, 2005), i.e. we asked respondents to rate the statement they mostly agreed with. “The next statements refer to different concepts of happiness. Please choose the one you agree mostly with”: “Happiness

is accepting things as they are (Stoicism)”; “Happiness is a sense of acting properly in our relationships with others and with ourselves (Virtue)”; “Happiness is an unreachable ideal we can only try to approach (Utopian)”; “Happiness is in living a tranquil life, not looking beyond what is attainable (Tranquility)”; “Happiness is in fully exercising our capabilities (Fulfillment)”; “Happiness is being satisfied with what I have and what I am (Satisfaction)”; “Happiness is to seize every moment in life (Carpe Diem)”; “Happiness is to enjoy what one has attained in life (Enjoyment)”. Respondents could only place themselves into one response category, with many individuals subscribing to a satisfaction (36%), carpe diem (21%) and enjoyment (11%) view of subjective well-being,⁵ as can be seen from the upper right panel of Figure 1. Virtue-based (7%), utopian (13%) and fulfillment (8%) accounts of the good life are also present, but only few subscribed to stoic (2%) or tranquility (1%) views of well-being. Figure 2 depicts individuals’ average life satisfaction ratings depending on the conceptual referent of the good life they subscribe to, with the lowest life satisfaction for utopians (6.52) and the highest for the virtue- (7.44) and fulfillment-based (7.32) views of the good life.

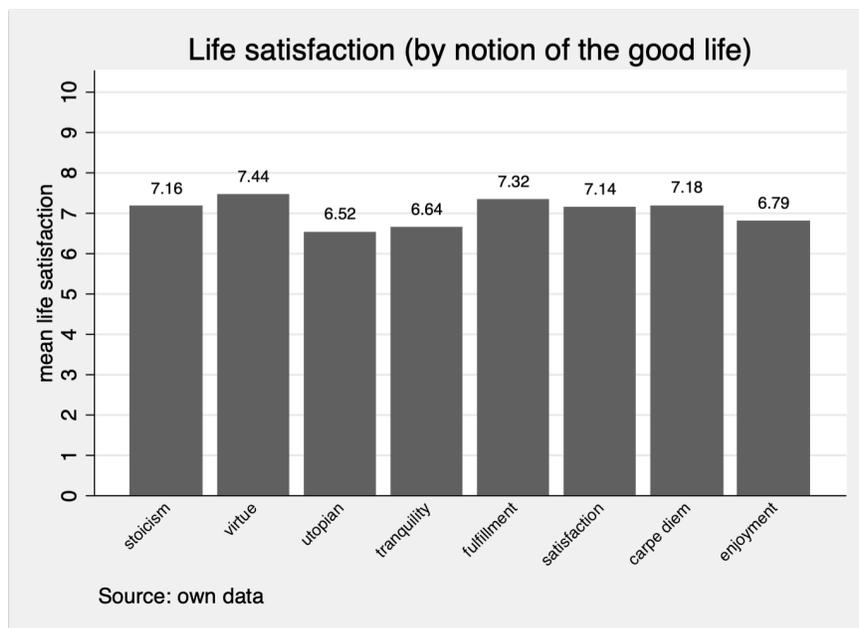


Figure 2: Raw life satisfaction by notion of the good life.

⁵Those are outer-oriented conceptions of happiness.

We capture individuals’ pro-environmental behavior by asking respondents to rate the frequency with which they conduct the following 20 behaviors: “Keep your TV on standby for the night”; “Switch off lights in rooms that aren’t being used”; “Keep the tap running while you brush your teeth”; “Put more clothes on when you feel cold rather than putting the heating on or turning it up”; “Decide not to buy something because you feel it has too much packaging”; “Buy recycled paper products such as toilet paper or tissues”; “Bring your own shopping bag when shopping”; “Separate waste (e.g. paper, plastic, domestic waste)”; “Use public transport (e.g. bus, train) rather than travel by car”; “Walk or cycle for short journeys less than 2 or 3 miles”; “Car share with others who need to make a similar journey”; “Take fewer flights when possible”; “Sign a petition on the issue of environmental protection”; “Participate at rallies for a greater level of environmental protection.”; “Consume no meat/animal products”; “Buy groceries with eco-seal”; “Buy other products with eco-seal (e.g. clothes, furniture)”; “Prefer to buy regional products.”; “Discard food”; “Reduce consumption generally in the daily routine”. Respondents can answer these on a 5-point Likert scale (from 0=“never”; 1=“seldom”; 2= “sometimes”; 3=“often”; 4=“always”; for some of these questions, the scale was reverse-coded in the questionnaire, which we have recoded for higher values to denote greener behavior). Actual participation in these behaviors varies, from “switching off lights in rooms that aren’t being used” being something most respondents do (mean 3.57; s.d. 0.80) to “going on green rallies” being comparatively rare (mean 0.68, s.d. 0.97).

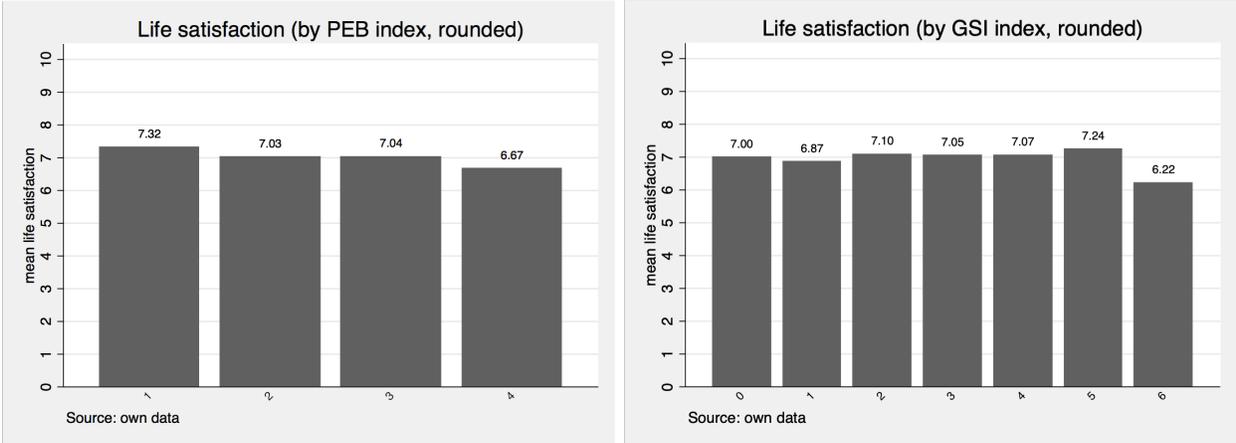


Figure 3: Raw life satisfaction by PEB index and GSI index (rounded values).

Based on these questions, we have created a pro-environmental behavior index (PEB index) summing up the responses and dividing them by the number of behaviors an individual responded to (this allows that some behaviors are not applicable to some persons). The mean number of reported environmental behaviors is 19.56 out of 20 (s.d. 1.79) and the mean value of our PEB index of environmentally friendly behaviors over all respondents is 2.07 points (s.d. 0.48). Its distribution is depicted in the left hand lower panel of Figure 1.

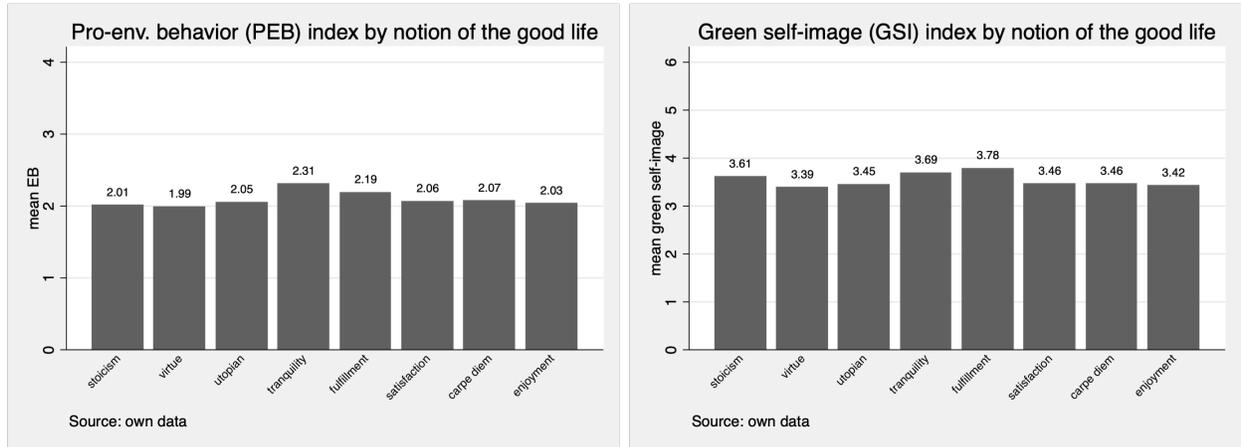


Figure 4: PEB and GSI index by notion of the good life.

Beside this green behavior variable, we are also interested in measuring green self-image. We create an index of green self-image averaging respondents’ answers to five questions which aim at measuring pro-environmental self-image and identification with the natural environment (Whitmarsh and O’Neill, 2010; Clayton and Opatow, 2003; Hinds and Sparks, 2008; University of Essex, 2015; Liebe, 2007; Sparks and Shepherd, 1992): respondents were asked to rate the degree to which they agree with the following statements: “Being a part of nature, is an important part of my self-perception (Q1)”, “My interests generally match with standpoints of environmentalists (Q2)”, “I consider myself as an environmentally aware consumer (Q3)”, “Any changes I make to help the environment need to fit in with my lifestyle (Q4)”, “Me doing things to help the environment is not worth it if others do not do the same (Q5)”. All questions can be answered on a 7-point Likert-scale with “0=totally disagree” up to “6=completely agree”. We have consistently recoded the answers so that higher values represent a higher level of green self-image. The mean number of self-image questions answered over all respondents is 4.96 (s.d. 0.30). The mean of the variable (“green

self-image, GSI”) of all respondents has a value of 3.48 (s.d. 0.91). The distribution of the self-image index is depicted in the right hand lower panel of Figure 1.⁶ When looking at the raw distribution of green behavior and green self-image, we can see that life satisfaction decreases with rising green behavior (left hand panel, Figure 3), whereas no clear trend is present for green self-image (right hand panel, Figure 3). More curiously, those in the highest green self-image bracket report the lowest life satisfaction of all categories (6.22), however, this highest category contains only $n = 9$ observations, two of which are as low as a life satisfaction value of 2 (similarly, the left-most category of zero (rounded) green self-image is occupied by a single individual).

It is also instructive to look into how green behavior and self-image differ by notion of the good life. Individuals subscribing to tranquility- and fulfillment-based views of the good life report slightly higher amounts of green behavior (left panel, Figure 4) and also higher levels of green self-image (right panel, Figure 4). Stoics also exhibit higher levels of green self-image, but this, perhaps true to form, does not translate into actual green behavior for them. A closer look at the distributional picture is also provided in Table 3, where we cross-tabulate the notions of the good life with our green self-image index (rounded values). A formal χ^2 test for distributional differences is inconclusive.

Following existing subjective well-being research, we use a set of control variables covering personal and socio-demographic information about the participants. We control for gender (62% female), age and its squared term (mean age of 21 years), and self-assessed health status (mean of 4.46 on a five point scale from “extreme problems” to “no health problems”, we treat the variable as continuous in our regressions). We also use a control variable for marriage status (single as baseline, 61%; plus stable relationships, 33%; married, 4%; separated or divorced, 2%; and widowed, 1%) and to account for differences in social life, we use two variables that measure contact to friends and neighbors (on a five point Likert scale from “1=never” to “5=on most days”), which we both treat as continuous.

⁶If this seems simplistic, we have also computed PEB and GSI index not just by simply averaging but by using principal component analysis (PCA) to create a composite variable out of all PEBs (and GSI questions respectively), maximising the shared variance explained by the resulting measures. These two indices have adequate econometric properties and results for the main analyses are very similar. The authors will share these analyses on request.

	Green self-image (GSI) index							Total
	0	1	2	3	4	5	6	
Stoicism	0	0	2	9	2	5	0	18 obs.
	0.00	0.00	11.11	50.00	11.11	27.78	0.00	100 %
Virtue	0	3	7	18	14	8	1	51 obs.
	0.00	5.88	13.73	35.29	27.45	15.69	1.96	100 %
Utopian	0	3	11	37	33	13	1	98 obs.
	0.00	3.06	11.22	37.76	33.67	13.27	1.02	100 %
Tranquility	0	0	0	5	5	1	0	11 obs.
	0.00	0.00	0.00	45.45	45.45	9.09	0.00	100 %
Fulfillment	0	1	3	20	25	14	1	64 obs.
	0.00	1.56	4.69	31.25	39.06	21.88	1.56	100 %
Satisfaction	0	4	35	106	104	27	5	281 obs.
	0.00	1.42	12.46	37.72	37.01	9.61	1.78	100 %
Carpe diem	1	4	13	60	64	13	1	156 obs.
	0.64	2.56	8.33	38.46	41.03	8.33	0.64	100 %
Enjoyment	0	0	11	35	26	10	0	82 obs.
	0.00	0.00	13.41	42.68	31.71	12.20	0.00	100 %
Total	1	15	82	290	273	91	9	761 obs.
	0.13	1.97	10.78	38.11	35.87	11.96	1.18	100 %
χ^2	41.61							
p	= 0.488							

Table 3: Green self-image index differences by notions of the good life.

As SWB and pro-environmental behavior may depend on one’s income, we control for the logarithm of monthly available money (+1, to account for those with zero available money). This variable does not further distinguish the source of a student’s income, i.e. whether the available money is labour income or a parental allowance. In addition, as many students are likely to still live with their parents (which does affect their cost of living), we also control for whether students live in their parents’ household (445 or 60% of students do so). The questionnaire asks students to note “What is the available amount of money you can spend each month (shopping, food, housing, etc.)? [In Euros]” and we will refer to this as their “income”. Mean monthly available income is Euro 389 (with a s.d. of Euro 743). The large standard deviation suggests that the sample has a number of extreme income observations, and trimming the sample to not incorporate the upper and lower 5% of income values yields a mean income of Euro 287 (with a s.d. of Euro 187). However, results do not change much comparing the trimmed and untrimmed data set.

In order to control for differences in response patterns, we also add variables for a short inventory of the Big Five personality traits (McCrae and Costa, 2003; Gosling et al., 2003; Lang et al., 2011). The five character traits of “Extraversion”, “Neuroticism”, “Openness”, “Agreeableness” and “Conscientiousness” have been elicited with three questions each (some reversed-coded) and the answers on a 7-point scale have been added up to form the final

personality variable, which we interpret as continuous in line with much of the literature. While having lower reliability than full personality inventories, the short personality inventory has sufficient validity and reliability and has been shown useful in other data sets (Gosling et al., 2003; Gerlitz and Schupp, 2005; Lang et al., 2011).⁷

For some of the robustness analyses, we also control for field of study by computing a dummy variable for all business-related students (47% are) and we also use a dummy variable that is coded as one for individuals who report being active in environmental organizations (7% report being active).

	Life satisfaction	Gender: female (0/1)	Age	Log(money+1)	Health status	PEB index	GSI index
Life satisfaction	1.00						
Gender: female (0/1)	-0.05 (0.1802)	1.00					
Age	-0.03 (0.4498)	-0.09* (0.0151)	1.00				
Log(available money+1)	0.03 (0.4690)	-0.01 (0.8528)	0.12** (0.0014)	1.00			
Health status	0.21*** (0.0000)	-0.08* (0.0261)	0.02 (0.6134)	0.01 (0.8298)	1.00		
PEB index	-0.06+ (0.0946)	0.07+ (0.0746)	0.05 (0.1700)	-0.02 (0.5212)	-0.01 (0.6943)	1.00	
GSI index	0.02 (0.5831)	0.07+ (0.0526)	0.07* (0.0457)	-0.04 (0.2358)	0.04 (0.3012)	0.46*** (0.0000)	1.00
Observations	798						

P-values in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Pearson correlation table.

Before going into the multivariate regression analysis, a look at bivariate (Pearson) correlations is in order (see Table 4). We do not find severe multicollinearity between our main variables,⁸ the strongest correlation is between actual green behavior and green self-image ($r = .46, p < .001$). Life satisfaction is positively correlated with health status ($r = .21, p < .001$). Life satisfaction is negatively related to the PEB index only at the ten percent level of significance in our sample ($r = -.06, p < .10$). Being female correlates negatively with health ($r = -.08, p < .05$) and age ($r = -.09, p < .05$). Higher incomes are associated with higher age ($r = .12, p < .01$), but not with stronger green self-image nor

⁷More details on the questions will be provided by the authors on request or can be found for instance in Binder and Freytag (2013): comparing the raw scores here with their UK sample from the British Household Panel Survey, Spanish students exhibit somewhat higher levels of both Openness, Extraversion and Neuroticism and lower levels of Conscientiousness.

⁸Reestimating our models below as OLS allows us to check variance inflation factors (VIF), which are well below critical thresholds (with the unsurprising exception of age and its squared term).

green behavior.

4. Multivariate regression results

Let us now turn to the analysis of notions of the good life, pro-environmental behavior and green self-image and their association with life satisfaction in a multivariate regression framework. Table 5 shows our main regression results. Given our small number of observations ($n = 640$ for most models), and the cross-sectional structure of our data set, we conduct an exploratory analysis of the relationship and refrain from giving the associations found a causal interpretation. We use ordered probit regressions to account for potential nonlinearities in our dependent variable but provide a comparison with an OLS model below.⁹ Standard errors are heteroscedasticity-robust.

As a side note, the control variables employed go into the directions expected from the subjective well-being literature. Briefly, we find positive associations between life satisfaction and (log) income, being married, being in a stable relationship and being in good health. The Big Five variables also show the expected patterns: while Extraversion (alongside Conscientiousness and Agreeableness) is positively associated with well-being, Neuroticism shows a negative association. Life satisfaction is u-shaped in age (although we have only very few observations with ages above 26).

When looking into the relationship between life satisfaction and the different notions of the good life (Table 5, column 1), we find a negative association between life satisfaction and those subscribing to a utopian notion of well-being ($b = -0.31, p < .05$), compared to the reference category of subscribing to a satisfaction view of well-being. This coefficient is quite substantial and e.g. rather close in absolute magnitude to the positive effect of being in a stable relationship (in OLS these coefficients are of identical size). All other notions of the good life coefficients are not significantly related to life satisfaction but take note that the cell numbers for some notions of the good life are small (e.g. 11 respondents checked the tranquility-based notion and 19 self-identified as stoics). With small samples, our

⁹Pseudo- R^2 s seem quite low, but the corresponding R^2 s for these models estimated as OLS are in the range between .12 – .17. R^2 s are generally not very high in subjective well-being studies, but this is not considered problematic (OECD, 2013, p. 221). Our R^2 s are in the upper range compared to the other PEB/SWB studies mentioned in the literature section.

	(1)	(2)	(3)	(4)	(5)	(6)			
	Notions of the good life	PEB/GSI	Both	Interaction	Income*PEB	Income*Good life			
Notions of the good life									
Stoicism	0.146	(0.59)	0.0878	(0.35)	-1.911*	(-2.03)	-0.821	(-0.48)	
Virtue	0.0152	(0.11)	-0.0136	(-0.10)	-0.803	(-1.19)	-1.002+	(-1.93)	
Utopian	-0.312*	(-2.36)	-0.317*	(-2.41)	0.235	(0.40)	-1.310+	(-1.72)	
Tranquility	-0.220	(-0.94)	-0.168	(-0.82)	1.081+	(1.68)	-0.101	(-0.13)	
Fulfillment	0.0282	(0.18)	0.0194	(0.13)	1.498*	(2.44)	-0.450	(-0.61)	
Carpe diem	0.0525	(0.45)	0.0618	(0.52)	0.0129	(0.02)	-1.181*	(-2.22)	
Enjoyment	-0.154	(-1.02)	-0.147	(-0.96)	0.0530	(0.07)	-1.573*	(-2.32)	
Green behavior and self-image									
GSI index (mean)		0.0998+	(1.84)	0.0984+	(1.81)	0.108*	(1.97)	0.101+	(1.84)
PEB index (mean)		-0.316*	(-3.20)	-0.315*	(-3.21)	-0.233	(-1.49)	-1.304*	(-3.32)
Interaction terms - Good life x PEB									
Stoicism X PEB index				1.022*	(2.22)				
Virtue X PEB index				0.401	(1.19)				
Utopian X PEB index				-0.272	(-0.96)				
Tranquility X PEB index				-0.541*	(-1.99)				
Fulfillment X PEB index				-0.682*	(-2.28)				
Carpe diem X PEB index				0.0221	(0.09)				
Enjoyment X PEB index				-0.100	(-0.27)				
Interaction terms - PEB x Income									
PEB index (mean) X log(income+1)					0.181*	(2.54)			
Interaction terms - Good life x Income									
Stoicism X log(income+1)							0.166	(0.53)	
Virtue X log(income+1)							0.184+	(1.82)	
Utopian X log(income+1)							0.182	(1.28)	
Tranquility X log(income+1)							-0.0120	(-0.08)	
Fulfillment X log(income+1)							0.0844	(0.62)	
Carpe diem X log(income+1)							0.233*	(2.28)	
Enjoyment X log(income+1)							0.264*	(2.09)	
Control variables									
Log available money	0.0765+	(1.65)	0.0692	(1.49)	0.0741	(1.59)	0.0813+	(1.71)	
Gender (female)	-0.120	(-1.30)	-0.104	(-1.14)	-0.117	(-1.24)	-0.112	(-1.18)	
Age	-0.0550+	(-1.79)	-0.0632*	(-2.11)	-0.0595+	(-1.95)	-0.0617*	(-2.06)	
Age ²	0.0543+	(1.72)	0.0630*	(2.05)	0.0587+	(1.87)	0.0631*	(2.07)	
Health status	0.267*	(4.74)	0.266*	(4.73)	0.258*	(4.54)	0.257*	(4.46)	
Living with parents (0/1)	0.0336	(0.36)	0.0137	(0.15)	0.0119	(0.13)	0.0382	(0.40)	
Social life: neighbours	0.0383	(1.13)	0.0436	(1.30)	0.0455	(1.35)	0.0403	(1.18)	
Social life: friends	0.0858	(1.29)	0.0907	(1.37)	0.0850	(1.28)	0.0784	(1.16)	
Married	0.491*	(2.31)	0.551*	(2.70)	0.528*	(2.47)	0.537*	(2.53)	
Stable relationship	0.287*	(3.20)	0.254*	(2.83)	0.276*	(3.08)	0.287*	(3.16)	
Divorced/separated	0.0878	(0.39)	0.147	(0.68)	0.0866	(0.39)	0.0160	(0.07)	
Widowed	0.119	(0.23)	0.0468	(0.08)	0.0474	(0.08)	0.0956	(0.17)	
Big Five									
Openness	0.0147	(1.24)	0.0209+	(1.72)	0.0187	(1.52)	0.0209+	(1.69)	
Conscientiousness	0.0447*	(2.81)	0.0528*	(3.40)	0.0538*	(3.39)	0.0535*	(3.35)	
Extraversion	0.0211+	(1.82)	0.0175	(1.52)	0.0189	(1.63)	0.0211+	(1.80)	
Agreeableness	0.0346*	(2.31)	0.0331*	(2.21)	0.0324*	(2.14)	0.0346*	(2.26)	
Neuroticism	-0.0447*	(-4.06)	-0.0456*	(-4.12)	-0.0468*	(-4.25)	-0.0466*	(-4.20)	
cut1									
Constant	-0.178	(-0.24)	-0.478	(-0.62)	-0.544	(-0.69)	-0.295	(-0.36)	
cut2									
Constant	-0.0396	(-0.05)	-0.340	(-0.45)	-0.405	(-0.52)	-0.155	(-0.19)	
cut3									
Constant	0.208	(0.28)	-0.0913	(-0.12)	-0.154	(-0.20)	0.101	(0.12)	
cut4									
Constant	0.481	(0.65)	0.185	(0.24)	0.124	(0.16)	0.386	(0.47)	
cut5									
Constant	0.772	(1.05)	0.480	(0.63)	0.420	(0.54)	0.685	(0.83)	
cut6									
Constant	1.115	(1.51)	0.824	(1.08)	0.767	(0.99)	1.034	(1.26)	
cut7									
Constant	1.609*	(2.18)	1.319+	(1.73)	1.267	(1.63)	1.540+	(1.87)	
cut8									
Constant	2.316*	(3.13)	2.023*	(2.64)	1.978*	(2.54)	2.261*	(2.74)	
cut9									
Constant	3.247*	(4.36)	2.957*	(3.85)	2.917*	(3.73)	3.205*	(3.87)	
cut10									
Constant	4.013*	(5.37)	3.727*	(4.84)	3.689*	(4.72)	3.980*	(4.81)	
Observations	640		640		640		640		
Model degrees of freedom	24		19		26		33		
Pseudo-R ²	0.04		0.05		0.05		0.05		
Log likelihood	-1160.99		-1160.10		-1155.80		-1150.08		
χ^2	118.19		122.18		129.90		160.89		
p	0.00		0.00		0.00		0.00		

z statistics in parentheses

+ p < 0.10, * p < 0.05

Table 5: Main models. Life satisfaction is the dependent variable. Models estimated using ordered probit regressions with heteroscedasticity-robust standard errors.

coefficients might overestimate the true association between notions of the good life and life satisfaction (Gelman and Carlin, 2014), therefore, future research should elicit bigger samples here to further confirm these results. In the current and subsequent models, we always draw comparisons to the standard “satisfaction” interpretation of the happiness question. For one, this notion of the good life is closest to how life satisfaction measures are usually seen in the literature. Secondly, it also constitutes the biggest group in our sample (36%), which makes it the natural base category. While it would certainly be interesting to also follow up this work by asking further questions as to whether, for instance, utopians are less satisfied with their lives than stoics are (etc.), looking into a full set of contrasts between all notions of the good life (and their interaction effects below), would go beyond the scope of the present paper and should be pursued by future work.

With regard to pro-environmental behavior (column 2), we find a negative association between our PEB index and life satisfaction ($b = -0.32, p < .05$). As ordered probit coefficients are not straightforward to interpret in terms of effect size, we provide marginal effects in Table 7 in the Appendix. Figure 5 shows the predicted probabilities (conditional on our variables from model 3 in Table 5) for falling into either high or very low life satisfaction categories for varying values of the PEB and GSI index to further unpack the ordered probit coefficients from our analysis.

Our sample thus indicates that Spanish students experience green behavior as a sacrifice, which requires further explanation as it contradicts the literature on pro-environmental behavior. Considering that two early studies have shown a positive PEB-SWB relationship with student samples (Kasser and Sheldon, 2002; Brown and Kasser, 2005), we want to explore a number of potential explanations for this finding in the current and the following sections. These explanations could relate to students having different priorities or subscribing to different notions of the good life than other samples, having lower incomes or being a self-selected group, for instance in terms of studying mostly business or economics and being potentially more self-interested than other samples (Frank et al., 1993). Our results are not entirely incompatible with the literature and especially chime with Suárez-Varela et al. (2016), who also did not find strong associations between water-saving behaviors and subjective well-being for their Granada sample (only installing water-saving technologies is positively related to life

satisfaction, and this might be due to the possibility of saving money). We have to keep in mind that different studies have used different PEBs and subsets of these might be associated positively with well-being, whereas we use a comprehensive index of different behaviors in our study. However, analysis not shown here reveals that very few pro-environmental behaviors in our sample are individually related to subjective well-being (related are: discarding food and not buying animal products).

A different explanation is provided by [Martínez-Espiñeira et al. \(2014\)](#), who argue that environmental awareness in Spain is still below the European average and that the Spanish produce more waste and recycle less than the European average. This lends itself to the interpretation that green behavior has a lower priority in Spain than in other samples. However, comparing our PEB index with a similarly constructed index for a representative UK sample ([Binder and Blankenberg, 2017](#)), we find the opposite, i.e. a Spanish mean PEB index of 2.07 against a UK level of 1.94 (difference statistically significant at $p < .001$). Our Spanish sample also acts more environmentally friendly in all types of behavior except for letting the TV on standby and letting tap water running while brushing teeth. This means that we do not have strong evidence for Spanish people being less environmentally friendly. On the contrary, we can conjecture that a potential explanation for a negative PEB-SWB relationship has to lie elsewhere (see below), but we cannot exclude the possibility that there might be a structural break in the PEB-SWB relationship, for example leading to pro-environmental behavior being positively related to subjective well-being at low levels of green behavior and then turning negative. We are not aware of an inverted u-shape hypothesis that has been tested before and our sample does not exhibit a non-linear relationship between pro-environmental behavior and life satisfaction (neither unconditionally so, nor in multivariate regression).

Green self-image, on the other hand, is positively associated with life satisfaction, albeit on the 10% level of significance ($b = 0.10, p < .10$). This supports the findings of [Binder and Blankenberg \(2017\)](#) and the idea that a potential well-being dividend for green behavior is related to green self-image, and may be dissociated from actual green behavior.¹⁰ Using both

¹⁰[Binder and Blankenberg \(2017\)](#) use a (perceived) “green lifestyle question” for reasons of data availability, whereas this paper uses an index of five identity questions. Using the green lifestyle question for our Spanish

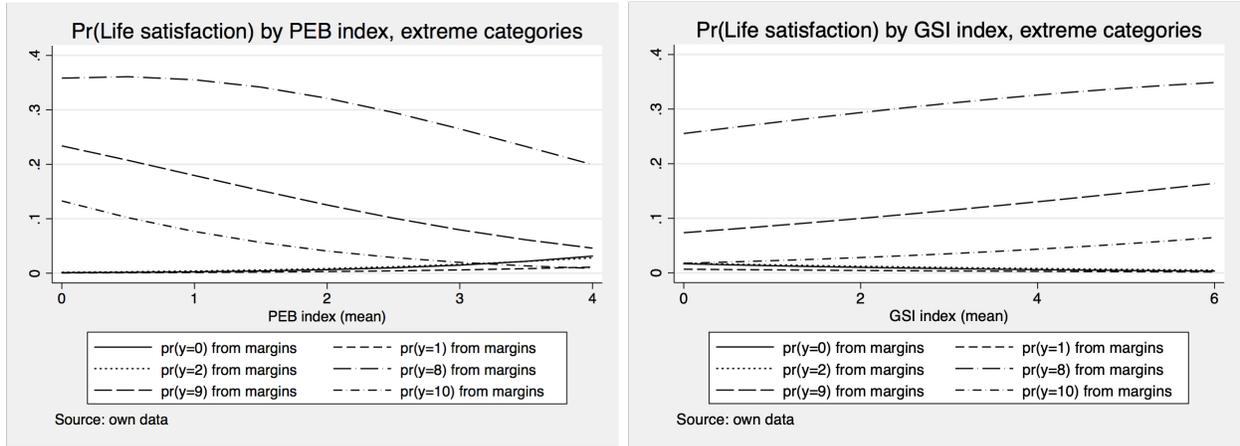


Figure 5: Predicted probabilities for extreme life satisfaction values (from model (3), conditional on control variables). Middle categories omitted for clarity of display. Predicted probabilities calculated for other control variables at their sample means using `mgen` for Stata (Long and Freese, 2014).

notions of the good life and PEBs/green self-image in the same model (column 3) yields a similar picture. However, we do not find statistically significant interaction effects between PEBs and green self-image.

We have also interacted the notions of the good life and PEB index (column 4). Coefficients for the good life are now denoting associations at zero green behavior. Though individuals seeking fulfillment ($b = 1.50, p < .05$) and tranquility ($b = 1.08, p < .10$) exhibit strongly increased SWB compared to the reference group, the reverse is true for stoics ($b = -1.91, p < .05$). In all three cases, interaction terms are statistically significant as well and the signs go in opposing directions: for the stoic, increasing pro-environmental behavior increases subjective well-being ($b = 1.02, p < .05$), whereas for someone having a tranquility- ($b = -0.54, p < .05$) or fulfillment-based ($b = -0.68, p < .05$) notion of the good life, increasing pro-environmental behavior is associated with lower life satisfaction. Wald tests confirm that these coefficients are jointly significant for all reported interactions unless mentioned otherwise (at 10% level or better).¹¹ While we again caution about the potential overestimation of coefficient sizes due to small sample size and low power, the signs of our findings suggest

student sample, we find no significant association with life satisfaction.

¹¹Ai and Norton (2003) caution about the interpretation of interaction terms in non-linear models, but most interactions reported in this paper are found in similar directions in OLS specifications, where interaction terms can be interpreted straightforwardly.

the following tentative explanation: individuals seeking a tranquil or fulfilled life seem to regard pro-environmental behavior as something that distracts them or prohibits them from either achieving tranquility or fully exercising their capabilities to achieve satisfaction (which seem to lie outside of environmentally friendly actions). Not performing green behaviors thus could free income and time to exercise these capabilities, yielding a boost in well-being, whereas conversely increasing pro-environmental behavior seems to act as hindrance for the fulfillment/exercise of their capabilities. For stoics, this relationship is reversed. This could be considered to be at least somewhat surprising as stoics do not seem entirely indifferent towards their environment (compared to the base category) and more pro-environmental behavior is associated with higher life satisfaction for them.¹² These interactions could provide an explanation for why different samples find different coefficient signs for the PEB-SWB relationship. When not adjusting for personal identity, unobserved difference in notions of the good life in different samples might drive the findings regarding a positive or negative PEB-SWB relationship. It has been shown in related literature that green identity mediates the value-behavior relationship (Steg, 2015) and our paper is amongst the first to suggest –and provide tentative evidence– that the PEB-SWB relationship might be driven in similar fashion by one’s identity.

Given the overall negative association between pro-environmental behavior and life satisfaction, it is instructive to unpack this further and also look into whether low student “incomes” might explain such a finding, i.e. money spent for pro-environmental behavior is money missing in providing for necessities, hence the well-being decreases (a real sacrifice in terms of income and well-being). We have interacted pro-environmental behavior and income (model 5) and indeed find a strong negative main effect for pro-environmental behavior absent income ($b = -1.30, p < .05$) and a positive interaction term ($b = 0.18, p < .05$), i.e. with increasing incomes, increasing one’s pro-environmental behaviors successively is associated with less strong decreases in life satisfaction. This finding is in line with previous research showing that green behaviors depend to some extent on individuals’ resources (e.g., Clark, 2003; Stern et al., 1999). The coefficient turns positive in this interaction model only for

¹²In a model not shown, we have also used dummy variables for the upper and lower 25% of the PEB distribution, which confirm the results presented here.

very high incomes, of which we have only very few observations in our sample (for these incomes, positive marginal effects are no longer statistically significant). In all these models, green self-image remains positively associated with life satisfaction, while PEB interaction models with green self-image do not yield statistically significant results (interaction models not shown).

Finally, we have also interacted our income variable with the coefficients for different notions of the good life (model 6). We find that absent income, both enjoyment and pleasure-centred (*carpe diem*) notions of the good life are negatively related to life satisfaction when compared to the reference category, and life satisfaction for those notions increases in income. The results confirm common sense and are in accordance with findings by [Rojas \(2007\)](#) about the importance of income for outer oriented notions of the good life. It should also be noted that a similar pattern exists for the virtue-based notion of the good life, where it seems that income is necessary in order to actually follow through with virtuous behavior and derive well-being benefits from it (see also below). The utopian dummy is negative and significant but its interaction term remains insignificant in this model.

5. Robustness and further analyses

A note on the robustness of our estimates with respect to model choice: the negative association between life satisfaction and pro-environmental behavior is robust across different estimators (ordered probit and OLS) as well as when using a more elaborately computed PEB index via principal component analysis (PCA). The positive association between the self-image index and life satisfaction is somewhat less robust: it can be found using the PCA version of the index independent of estimation strategy, but its simple version is not statistically significant using OLS.¹³ Some of the interactions between PEBs and notions of the good life disappear under alternative model specifications,¹⁴ but the utopian- and fulfillment-based coefficients are rather robust across different model specifications. Especially model 6,

¹³Further analysis reveals this is due to two outliers: two students with very high incomes, high green self-image but low life satisfaction. Without those, the simple GSI index is also positively related to life satisfaction in OLS.

¹⁴This is only partly surprising considering that the sample size is different by about 100 observations when using the PCA indices.

	(1)		(2)		(3)		(4)	
	Upper half: income		Interaction		Env.org.		Business students	
Notions of the good life								
Stoicism	0.225	(0.78)	-0.108	(-0.08)	0.107	(0.43)	0.411	(1.35)
Virtue	0.235	(0.99)	-2.281 ⁺	(-1.89)	-0.00456	(-0.03)	0.0152	(0.08)
Utopian	-0.127	(-0.67)	0.756	(0.90)	-0.315*	(-2.35)	-0.607*	(-3.47)
Tranquility	-0.406	(-1.28)	-1.503	(-0.84)	-0.125	(-0.53)	-0.541 ⁺	(-1.86)
Fulfillment	0.0619	(0.29)	1.544 ⁺	(1.88)	0.0335	(0.22)	-0.0261	(-0.11)
Carpe diem	0.0750	(0.40)	0.0243	(0.03)	0.0653	(0.54)	-0.0120	(-0.07)
Enjoyment	0.107	(0.52)	-0.482	(-0.50)	-0.162	(-1.07)	-0.210	(-0.98)
Green behavior and self-image								
GSI index (mean)	0.171*	(2.09)	0.186*	(2.20)	0.0997 ⁺	(1.81)	0.102 ⁺	(1.81)
PEB index (mean)	-0.163	(-1.15)	-0.0747	(-0.31)	-0.285*	(-2.86)	-0.317*	(-3.13)
Interaction terms - Good life x PEB								
Stoicism X PEB index			0.183	(0.23)				
Virtue X PEB index			1.129*	(2.02)				
Utopian X PEB index			-0.430	(-1.10)				
Tranquility X PEB index			0.361	(0.54)				
Fulfillment X PEB index			-0.692 ⁺	(-1.66)				
Carpe diem X PEB index			0.0183	(0.05)				
Enjoyment X PEB index			0.298	(0.61)				
Interaction terms - Good life x Area of study								
Area of studies: business/econ/finance (0/1)					-0.114	(-1.35)	-0.234 ⁺	(-1.68)
Stoicism X area of studies: business/econ/finance=1							-0.523	(-1.12)
Virtue X area of studies: business/econ/finance=1							-0.0961	(-0.34)
Utopian X area of studies: business/econ/finance=1							0.625*	(2.34)
Tranquility X area of studies: business/econ/finance=1							0.712	(1.60)
Fulfillment X area of studies: business/econ/finance=1							0.0563	(0.18)
Carpe diem X area of studies: business/econ/finance=1							0.161	(0.67)
Enjoyment X area of studies: business/econ/finance=1							0.0852	(0.28)
Active in env.organisation					-0.316 ⁺	(-1.81)		
Observations	305		305		636		636	
Model degrees of freedom	26		33		28		34	
Pseudo-R ²	0.06		0.06		0.05		0.05	
Log likelihood	-555.11		-550.52		-1145.55		-1143.28	
χ^2	87.72		108.84		137.20		139.21	
p	0.00		0.00		0.00		0.00	

z statistics in parentheses
⁺ $p < 0.10$, * $p < 0.05$

Table 6: Robustness regressions. Life satisfaction is the dependent variable. Models are ordered probit regressions with heteroscedasticity-robust standard errors. Same control variables as in main analysis, but not shown here.

the interaction model of notions of the good life with income, is robust across all different econometric approaches.

We also further explore our results in the following ways (see Table 6): First, we split our sample into a low and high income group by doing a median split based on log income (columns 1 and 2). Looking only at the upper half of students income-wise, we find no differences in SWB depending on the notions of the good life (our sample size is reduced to 305 observations). PEBs are no longer negatively related to life satisfaction, and green self-image is more strongly positively related to life satisfaction ($b = 0.17, p < .05$). In the interaction model (column 2), for those in the upper half of the income distribution, subscribing to a virtue-based notion of the good life, we find a strong negative relationship

with life satisfaction ($b = -2.28, p < .10$) with a positive interaction term ($b = 1.13, p < .05$). This would be consistent with virtue-based behavior and being pro-environmental becoming feasible only after securing one's own needs. Past a certain income threshold acting in accordance with one's world-view becomes more relevant for SWB (compare coefficient sizes between this model and the model in Table 5, column 6). A fulfillment-based view of the good life interacts in the same way with life satisfaction as previously shown for the full sample.

In addition, we have looked into field of study apart from considering whether organized environmental activism confirms the negative association between pro-environmental behavior and life satisfaction (column 3) and indeed we find a negative association of life satisfaction with environmental activism ($b = -0.32, p < .10$). With regard to field of study (column 4), we find a positive interaction term ($b = 0.63, p < .05$) for those from business-related fields with a utopian notion of well-being, while we find a negative (main) association of the utopian notion with life satisfaction ($b = -0.61, p < .05$). Where the business studies dummy is negative ($b = -0.23, p < .10$) when subscribing to the typical satisfaction view of the good life (our reference category), the interaction effect shows here, too, that such negative association disappears when conceiving of happiness from a utopian perspective: utopians derive additional satisfaction here from their chosen field of studies whereas the reference group has lower satisfaction when studying business related topics. In general, however, we found no evidence to show that business and economics students are less happy than other students in our sample, and we also could not find evidence showing that the negative PEB-SWB relationship is driven by this type of students, as an interaction term between pro-environmental behavior and the economics/business-dummy variable is statistically insignificant.

6. Conclusion and limitations

Our perceptions shape our world. In this paper, we explored the role played by pro-environmental behavior and green identity in the life satisfaction of a sample of university students in Granada (Spain). Following up on a literature that often finds positive associations between pro-environmental behavior and life satisfaction, with a suspicion that some part of this association might not be a result of actual behavior but rather that of one's

perception of the world (Binder and Blankenberg, 2017; Welsch and Kühling, 2018), we have unpacked the role of behavior and identity in a twofold way: drawing on theories of identity (Biddle et al., 1987; Sparks and Shepherd, 1992; Akerlof and Kranton, 2010; Whitmarsh and O’Neill, 2010; Steg, 2015), we first created an index to measure respondents’ green self-image as well as an index capturing pro-environmental behavior. Secondly, we used “conceptual referent theory” (Rojas, 2005), interpreting these notions of the good life developed therein as a facet of individuals’ identity more broadly than just relating to green behavior.

Our findings cast doubt on a general “double dividend” from pro-environmental behavior (Jackson, 2005): acting in green ways is not always associated with higher well-being but can come at a cost, even in the currency of subjective well-being. For Spanish students, doing more things in a green way is associated with lower life satisfaction. This is likely due to their low monthly available income and different notions of what constitutes the good life, potentially shaping their attitudes about green behavior. This negative association decreases with available income. Our research also helps better understand the conditions under which pro-environmental behavior can lead to higher life satisfaction: we find that having a greener self-image is robustly related to higher life satisfaction irrespective of green behavior. While we do not find many well-being differences comparing the notions of the good life with the reference category (only utopians are significantly less happier), different notions of the good life interact in interesting ways with green behavior regarding their impact on life satisfaction: stoics have lower well-being when doing nothing for the environment and their life satisfaction increases with greener behavior. Respondents subscribing to a fulfillment- or tranquility-based view of well-being, on the other hand, have a higher life satisfaction when being environmentally unfriendly and their well-being becomes lower the more pro-environmentally they act. There is further heterogeneity amongst wealthier students, given that subscribing to a virtue-based notion of the good life is negatively associated with well-being when being environmentally unfriendly, and well-being increases with greener behavior. By unpacking green behavior and identity this way, we have contributed to better understanding the forces of self-selection that govern the relationship between PEBs and subjective well-being. Following the classification of Rojas (2005), stoicism and virtue are related to an inner orientation of life (with tranquility having a partially inner compo-

ment), while fulfillment is understood to have an outer component. Our results are in line with the intrinsic vs. extrinsic motivations on conditioning the relationship of life satisfaction and acting pro-environmentally (Kasser, 2017, with the particular exception of tranquility that may be considered to have a somewhat inner component). But by considering different notions of the good life, we allow for a richer picture than a dichotomous classification of motivations in life.

Our research, while being novel and perhaps surprising with regard to the resulting negative relationship between PEB and SWB, is not without its limitations. First of all, we draw on cross-sectional data and any causal interpretation thereof should be understood to be tentative at best. Higher levels of green behavior might lead to lower life satisfaction in our sample, or individuals that are less happier may turn to green behaviors in search of meaning and happiness. A negative association between stoicism and subjective well-being could mean that stoics are unhappier than other people or that unhappy people find solace in a stoicist world-view. In addition, our key variables may be driven by omitted third factors: for instance, a green self-image may correlate with higher life satisfaction as both are being caused by unobserved personality traits such as an optimistic disposition. Surveying the literature on the PEB-SWB relationship, Kasser (2017) finds evidence for a causal arrow from PEBs to SWB, but highlights research that happier people are more generous (Lyubomirsky et al., 2005) and hence showing that a simultaneous reverse causal pathway cannot be excluded. Similarly, the author also points to the role of intrinsic values (and potentially identity) that could at the same time influence both pro-environmental behavior and subjective well-being. We are not aware of research that would help make a similar case with regard to the notions of the good life and would generally caution the reader about making strong causal claims. Future research should come up with experimental procedures that shed light on the predominant causal direction here.

Secondly, our research draws entirely on self-reports, introducing the threat of common-method variance. In addition, self-reports might be biased due to imperfect recall or social desirability bias. Research regarding social desirability bias shows that this does not play a big role when it comes to reporting pro-environmental behaviors (Kaiser, 1998; Milfont, 2009). Studies validating self-reports with external measures provide a bigger threat to validity.

Individuals are not good at, for instance, estimating their ecological footprint correctly (Bleys et al., 2017). Assessing one's habits of running tap water is a comparatively easier task, however, and in a meta-analysis of studies validating self-report PEBs, Kormos and Gifford (2014) come to the conclusion that the overall correlation between self-reported and actual PEBs is strong and has a conventionally high effect size ($r = .46$). Nevertheless, Kormos and Gifford (2014) caution that due to heterogeneity and the large amount of unexplained variance (79%) in predicting actual PEBs from self-reports in their meta-analysis, their results should be seen with caution.¹⁵ Our own previous research has shed light on the fact that individuals seem to see themselves as greener than they actually report in terms of their actual PEBs (Binder and Blankenberg, 2017). The latter study, in our opinion, may alleviate the concern that PEB self-reports are overly biased towards greenness at least to some extent or otherwise there would be no big discrepancies between those self-reports and assessments of green self-image. Future work should examine the specific type of self-reported PEBs that have higher validities due to low memory distortions, but based on the above literature, we would see self-reports of pro-environmental behaviors as a convenient and valid measure for actual pro-environmental behavior (Kormos and Gifford, 2014, p. 369).

Thirdly, our sample consists entirely of Spanish students, and other studies have argued that the Spanish differ in their environmental attitudes in ways from other European countries such as Germany or the UK (Suárez-Varela et al., 2016; Martínez-Espiñeira et al., 2014). A sample containing students makes for a peculiar group (low available amount of money being just one characteristic), as they may act less pro-environmentally despite being more concerned about the environment, in comparison to more general samples (although the evidence on age differences in PEB is decidedly mixed, see Grønhøj and Thøgersen, 2012; Gifford and Nilsson, 2014; Wiernik et al., 2013). Two of the first studies looking into the PEB-SWB relationship draw on a school and a student sample and find a positive relationship (Kasser and Sheldon, 2002; Brown and Kasser, 2005). On the other hand, the literature on students' green self-image or their conceptual referents when it comes to happiness is scarce. This

¹⁵A low R^2 in that case is a problem, as self-reported PEBs are interpreted as a measure of the behavior itself. For our study, a low R^2 is not a problem, as we are interested in whether our X variables are related to SWB.

clearly poses a threat to the external validity of our analysis. Yet, if students are less likely to act pro-environmentally ([Grønhøj and Thøgersen, 2012](#)), in addition to business or economics students being more self-centered, they would therefore also potentially undertake less PEBs ([Frank et al., 1993](#)). This does not cause reason to think that the positive link between PEBs and SWB would be absent or different for student samples; it would rather just mean that lower pro-environmental behavior of students translates into lower subjective well-being (*ceteris paribus*). But maybe this *ceteris paribus* relationship should also be reconsidered from a holistic point of view. The research finding a positive relationship is based on students in the United States during a cycle of economic prosperity. Meanwhile, the data set used in this paper comprises students from a Spanish public university, after a period of economic crisis that has undermined working possibilities in the labour market, and has decreased education budget ([Guardiola and Guillen-Royo, 2015](#)). Culture and macroeconomic conditions could determine whether a PEB-SWB relationship is positive or negative. In this vein, further evidence on different cultures and macroeconomic environments would be useful in order to find a valid explanation. But at this time, we simply have no reason to believe that pro-social or pro-environmental behavior itself would not cause happiness in students, as the potential causal pathways would be similarly present across samples (acting pro-environmentally/pro-socially causes need satisfaction in terms of relatedness needs according to self-determination theory; see [Kasser, 2017](#)).

When it comes to identity in general (as well as notions of the good life), we would expect differences in terms of the distributional picture between students and, say, the elderly. It is highly likely that our identity evolves over the life course. For instance, if older samples would have more individuals subscribing to a virtue-based view of the good life, our study suggests that this would lead to more green behavior and higher well-being of this segment of the populace (all else equal). But ultimately, we cannot exclude the possibility that the relationships found in this study would change themselves between the two age groups or between students and other socio-demographic groups. Further research in this area, that also extends to more representative samples, can be a next step in better understanding how identity shapes the PEB-SWB relationship. However, extending research on the heterogeneity of pro-environmental behaviors, i.e. research that can explain the moderating and

mediating influences for the PEB-SWB relationship, will be more useful than research on average effects with representative samples. Our study here highlights the importance of better understanding the variables that influence the PEB-SWB relationship. Motivations relating to green behaviors, in addition to notions of the good life, will likely shape whether pro-environmental behavior can increase well-being. What most related literature does so far is implicitly ignore the different reasons for which people act pro-environmentally (to be green, to save money, etc.), something to be unpacked in future work, and which could also potentially explain the negative relation between pro-environmental behavior and subjective well-being in our sample.

Nonetheless, when it comes to subjective well-being and the exploration of the heterogeneous impact of its determinants, it is necessary to pay closer attention to identity and to account for the subjective perceptions that we have of the world and our actions in it. Such an insight, we argue, should be used with care when it comes to forming policy advice: more pro-environmental behaviors do not lead uniformly to higher well-being across the population and the alleged double dividend might not be paid to everybody uniformly. Unless one holds the view that governments are in the business of shaping individuals' identities, promoting more pro-environmental behavior as a way to gain well-being would have to be evaluated more sceptically considering the heterogeneity in the PEB-SWB relationship identified in this study. But ours is an isolated study and dependable policy-implications should rather be developed on the basis of a body of work and a systematic meta-analytic review across the whole state of the field.

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Declarations of interest

None

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Appendix

	PR(life satisfaction)										
	0	1	2	3	4	5	6	7	8	9	10
GSI Index											
+1	-0.003	-0.001	-0.002	-0.003	-0.004	-0.006	-0.009	-0.007	0.011	0.014	0.011
p-value	0.079	0.148	0.094	0.093	0.081	0.071	0.077	0.113	0.046	0.074	0.103
+SD	-0.002	-0.001	-0.002	-0.003	-0.004	-0.006	-0.008	-0.006	0.010	0.013	0.009
p-value	0.081	0.150	0.096	0.094	0.083	0.072	0.077	0.110	0.048	0.073	0.101
Marginal	-0.003	-0.001	-0.002	-0.003	-0.005	-0.006	-0.009	-0.006	0.012	0.014	0.010
p-value	0.102	0.163	0.111	0.108	0.093	0.077	0.074	0.081	0.068	0.070	0.082
PEB Index											
+1	0.013	0.004	0.009	0.012	0.016	0.021	0.027	0.009	-0.045	-0.041	-0.025
p-value	0.040	0.156	0.050	0.022	0.008	0.003	0.001	0.001	0.005	0.001	0.000
+SD	0.005	0.002	0.004	0.006	0.008	0.010	0.014	0.007	-0.020	-0.021	-0.014
p-value	0.027	0.146	0.042	0.018	0.007	0.003	0.001	0.001	0.004	0.001	0.001
Marginal	0.009	0.003	0.007	0.011	0.015	0.021	0.030	0.019	-0.037	-0.045	-0.032
p-value	0.018	0.135	0.034	0.014	0.005	0.003	0.002	0.003	0.002	0.002	0.003
Stoicism (0 to 1)											
+1	-0.002	-0.001	-0.002	-0.003	-0.004	-0.006	-0.008	-0.006	0.010	0.013	0.009
p-value	0.707	0.715	0.715	0.717	0.720	0.724	0.730	0.754	0.706	0.731	0.744
Marginal	-0.003	-0.001	-0.002	-0.003	-0.004	-0.006	-0.008	-0.005	0.010	0.012	0.009
p-value	0.731	0.733	0.731	0.730	0.730	0.728	0.727	0.728	0.728	0.728	0.729
Virtue (0 to 1)											
+1	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	-0.002	-0.002	-0.001
p-value	0.924	0.924	0.924	0.924	0.923	0.923	0.923	0.922	0.924	0.923	0.922
Marginal	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	-0.002	-0.002	-0.001
p-value	0.923	0.923	0.923	0.923	0.923	0.923	0.923	0.923	0.923	0.923	0.923
Utopian (0 to 1)											
+1	0.013	0.004	0.009	0.013	0.016	0.021	0.027	0.009	-0.045	-0.042	-0.025
p-value	0.078	0.202	0.106	0.054	0.038	0.022	0.009	0.002	0.035	0.009	0.004
Marginal	0.009	0.003	0.007	0.011	0.015	0.021	0.030	0.019	-0.038	-0.045	-0.032
p-value	0.032	0.167	0.072	0.033	0.026	0.021	0.020	0.027	0.018	0.018	0.020
Tranquility (0 to 1)											
+1	0.006	0.002	0.004	0.006	0.008	0.011	0.015	0.007	-0.022	-0.023	-0.015
p-value	0.486	0.498	0.466	0.452	0.438	0.420	0.396	0.236	0.455	0.393	0.356
Marginal	0.005	0.002	0.004	0.006	0.008	0.011	0.016	0.010	-0.020	-0.024	-0.017
p-value	0.419	0.454	0.423	0.417	0.414	0.412	0.418	0.426	0.413	0.413	0.417
Fulfilment (0 to 1)											
+1	-0.001	-0.000	-0.000	-0.001	-0.001	-0.001	-0.002	-0.001	0.002	0.003	0.002
p-value	0.896	0.895	0.895	0.896	0.897	0.897	0.898	0.900	0.896	0.897	0.899
Marginal	-0.001	-0.000	-0.000	-0.001	-0.001	-0.001	-0.002	-0.001	0.002	0.003	0.002
p-value	0.898	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897
Carpe diem (0 to 1)											
+1	-0.002	-0.001	-0.001	-0.002	-0.003	-0.004	-0.006	-0.004	0.007	0.009	0.007
p-value	0.594	0.592	0.598	0.589	0.598	0.601	0.608	0.632	0.584	0.607	0.623
Marginal	-0.002	-0.001	-0.001	-0.002	-0.003	-0.004	-0.006	-0.004	0.007	0.009	0.006
p-value	0.616	0.609	0.613	0.601	0.607	0.606	0.605	0.604	0.604	0.604	0.607
Enjoyment (0 to 1)											
+1	0.005	0.002	0.004	0.005	0.007	0.010	0.013	0.007	-0.019	-0.020	-0.013
p-value	0.413	0.435	0.388	0.382	0.369	0.349	0.315	0.183	0.378	0.319	0.282
Marginal	0.004	0.001	0.003	0.005	0.007	0.010	0.014	0.009	-0.017	-0.021	-0.015
p-value	0.353	0.397	0.348	0.350	0.348	0.342	0.335	0.339	0.338	0.336	0.337
Average predictions											
Pr(y—base)	0.013	0.005	0.012	0.022	0.035	0.060	0.128	0.243	0.297	0.130	0.055

Table 7: Marginal effects (AMEs) computed using `mchange` for Stata (Long and Freese, 2014). The table depicts marginal changes (marginal) as well as one unit changes (+1) for the PEB and GSI indices. For notions of the good life, a one unit change corresponds to the difference between a satisfaction view (reference category) and falling into the respective categories. In the case of continuous indices, we also list one standard deviation changes (+SD). All marginal effects presented with p-values.