

Article

# Pro-Environmental Behavior, Connectedness to Nature, and Wellbeing Dimensions among Granada Students

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**Abstract:** This paper aims to answer the following research questions: Are there differences between individual and collective pro-environmental behaviors (PEBs) in their relationship with wellbeing? What role does connectedness to nature play in those relationships? We understand individual PEBs as efforts to consume less and to reduce the environmental impact of consumption, whereas we define collaborative PEBs in terms of environmental activism. We consider connectedness to nature as a potential factor moderating the relationship between PEBs and wellbeing. The study incorporates several dimensions of wellbeing: cognitive, affective and eudaimonic. We use regression analysis to study the extent to which individual and collective PEBs explain the three wellbeing dimensions and we explore the moderating role of connectedness to nature using data from a sample of 973 students at the University of Granada (Spain). Results indicate that individual PEBs are positively related to the eudaimonic dimension of wellbeing but they do not explain the cognitive and affective dimensions. In contrast, collaborative PEB is negatively related to life satisfaction, our measure of the cognitive dimension, but not significantly related to the other wellbeing measures. Based on this evidence, we can answer our first research question in the affirmative. As for the second question, our results suggest that connectedness to nature plays a moderating role in the relationship between life satisfaction and collaborative PEBs, as the initially negative relationship is reversed when people feel highly connected to nature.

**Keywords:** happiness; wellbeing; pro-environmental behaviors; connectedness to nature; activism; sustainable consumption

## 1. Introduction

Climate change, along with other man-made environmental problems, is currently a major global concern. High levels of greenhouse gas emissions have been the main cause of global warming since the second half of the twentieth century, which has severely affected the natural and human systems of all continents and oceans [1]. The transition to a sustainable society cannot be put off any longer and requires changing the way we live, as well as a radical transformation of the economy, in terms of both supply and demand.

On the demand side, reducing consumption and turning to renewable and eco-friendly energy systems is crucial. However, to what extent does engaging in pro-environmental behaviors (PEBs) represent a sacrifice? From an economic perspective, protecting the environment may be understood as involving a sacrifice in terms of time or money [2]. As argued by Binder and Blankenberg [3], the standard view in economics is that lower income means lower welfare. Nevertheless, most scientific

evidence so far suggests that engaging in individual PEBs, that is, consuming differently (recycling, buying second hand, shopping for local produce, etc.) or consuming less (eating less meat, reducing areas being heated or cooled, flying less, etc.), is not experienced as a sacrifice [4,5]. Research linking subjective wellbeing (we use the terms wellbeing, subjective wellbeing and happiness synonymously, to encompass different facets of being well, such as a cognitive evaluation of wellbeing, or more emotional experiences [6]) and individual PEBs has found a not-significant or even a positive association between indicators approximating the two concepts [3–5,7,8], with very few exceptions [9,10]. These findings suggest the possible existence of a “double dividend” [11], which implies that being pro-environmental is good for both the environment and for individuals’ wellbeing.

However, the relationship between wellbeing and collaborative PEBs, where people join forces with others to work towards social or environmental change, is still largely unexplored. Some evidence suggests a positive relationship between wellbeing and low-risk activism because of the latter’s implicit values of caring for others and its positive contribution to the psychological needs of socializing, learning and implementing new skills [12,13]. Nevertheless, when activism involves actions such as blocking roads or access to public/private buildings, which might pose a risk to the participants’ physical integrity, the positive relationship with wellbeing may be challenged [13]. In short, individual PEBs that aim to reduce environmental impact through consuming more responsibly [14,15] and collective PEBs that aim to create large-scale societal change [16,17] may have different links with wellbeing, as these two kinds of actions involve different risks. The question of the extent to which individual and collective PEBs differ in their relationship with wellbeing remains unexplored, and is the first research question in this paper.

The second question we explore is how connectedness to nature influences those relationships. Connectedness to nature refers to the extent to which an individual includes nature within his/her concept of ‘self’ [18], and is found to be positively associated with wellbeing and PEBs [19–22]. This positive relationship might be explained by the experience of kinship and belongingness linked to feeling connected to nature, which may simultaneously increase people’s wellbeing and reduce their engagement in environmentally harmful practices [23,24]. Moreover, the association between PEBs and wellbeing may differ according to people’s level of connectedness to nature: people who feel a strong connection to the natural environment might experience higher levels of wellbeing when engaging in PEBs. This implies that ‘connectedness to nature’ could be considered as a moderating factor that strengthens the positive association between PEBs and wellbeing often found in the literature.

To the best of our knowledge, these two questions have not been dealt with in previous research. Connectedness to nature has been used as a mediator [24–27] and as a moderator [20] in past literature addressing the beneficial role of nature and its relationship with PEBs or wellbeing, but it has never been proposed as a moderator in the PEBs-wellbeing relationship. In addition, most of the literature on wellbeing and PEBs focuses on a single wellbeing indicator, whereas in this study we analyze the relationship between PEBs and three distinct dimensions of wellbeing. In order to explore the research questions, we use regression analysis with data from a sample of 973 students from the University of Granada, Spain. We consider life satisfaction and positive and negative affect (PANAS) to encompass the cognitive and affective dimensions of wellbeing, respectively, and the Subjective Vitality Scale to address its eudaimonic dimension [28]. The original conceptualization of eudaimonia comes from Aristotle, who understood it as the state of wellbeing that relates to the good life, derived from people exercising their highest faculties in terms of ethics and reason. In this paper, we follow the recent conceptualization from human psychology, which emphasizes the outcomes indicative of a good life, such as vitality, intimacy, health, and sense of meaning, among others [29]. Following this new understanding of eudaimonia, we use Ryan and Frederick’s [28] Subjective Vitality Scale as a proxy of one of these outcomes. Most previous studies on wellbeing and PEBs approximate wellbeing through life satisfaction, but it is our understanding that actions related to sustainable consumption—such as buying recycled products, recycling or using public transport instead of travelling by car—as well as pro-environmental activism, might also relate to the positive emotions derived from socially

responsible behaviors. Furthermore, engaging in sustainable consumption and activism might have a positive impact on the psychological needs for competence, relatedness and autonomy, which would explain their potential contribution to higher levels of vitality.

The remainder of this article is divided into the following sections: In Section 2 we present a general description of the literature on subjective wellbeing, with a special emphasis on the empirical evidence on the relationship between PEBs and wellbeing, as well as the role that connectedness to nature may play; in Section 3 we describe the data used in the research, present the hypotheses and the method of analysis; in Section 4 we show the results obtained; in Section 5 we discuss the main findings, and reflect on the limitations of the study; and finally in Section 6 we conclude.

## 2. Literature Review

The relationship between engaging in individualistic and collaborative PEBs and individuals' wellbeing is the focus of a burgeoning body of literature. Researchers have also turned their attention to the influence of connection with nature on wellbeing and PEBs. In the two subsections that follow, we highlight the most prominent findings of the literature on PEBs and wellbeing (Section 2.1) and those on connectedness to nature, PEBs and wellbeing (Section 2.2). Our aim is to evaluate the state of the research in order to identify what remains to be done. Next, we propose our hypotheses that seek to contribute new knowledge to the literature, and give shape to our two main research questions: Are there differences between individual and collective PEBs in their relationship with wellbeing? What role does connectedness to nature play in those relationships?

### 2.1. Pro-Environmental Behaviors and Subjective Wellbeing

PEBs can be considered an umbrella term encompassing both individual activities, such as recycling or flying less, and collectively oriented endeavors, such as organizing a clothes swap or campaigning for better collective transport. Most studies addressing the relationship between PEBs and wellbeing focus on behaviors of an individualistic nature. Thus, the question of whether individuals engage in sharing, reusing, repairing, recycling or choose products and services with a lower environmental impact (for example train versus plane or vegetarian versus animal protein-based food) has been the focus of a growing number of studies concerned with the wellbeing implications of making individuals' and households' lifestyles more sustainable [8,10].

Nevertheless, it is generally accepted that structural or large-scale societal change is necessary to address current environmental challenges associated with climate change, bio-diversity loss and natural resource exhaustion [16]. This is unlikely to be achieved through changes in selected individual consumption practices and might instead require actions at the collective level, through political and environmental activism [17,30]. Participating in environmental organizations, actively engaging in protests, peaceful acts of resistance or local ecological regeneration projects and campaigning for green political parties are activities that go beyond the individual. Their success in changing unsustainable structures, policies, regulations and practices depends on people joining forces with other concerned citizens or grassroots organizations. It is thus important to distinguish between individual PEBs, which aim to reduce environmental impact by consuming more responsibly, and collective PEBs, which aim to create large-scale societal change. Identifying differences in wellbeing between these two kinds of PEBs could enable a better understanding of how PEBs interact with human motivations. To the best of our knowledge, the present study is the first to examine those differences, although there is some evidence in the literature addressing the two kinds of PEBs separately.

#### 2.1.1. Sustainable Consumption and Subjective Wellbeing: The Individual Level

The sustainable consumption concept encompasses both 'strong sustainability' measures, involving reductions in the total level of consumption and 'weak' measures concerning, for example, energy saving or recycling practices [31]. Studies on the relationship between wellbeing and individuals' engagement in specific or general sustainable consumption practices suggest that

sustainable consumption is compatible with the hedonic, cognitive and eudaimonic dimensions of wellbeing.

Previous literature has provided evidence that engaging in PEBs involving sustainable consumption is associated with higher levels of subjective wellbeing [7,15,32]. These studies assess the PEBs of individuals through their participation in practices such as purchasing green products, using water sparingly, turning off lights when not in use, setting heating at a moderate temperature, reusing paper and plastic bags or buying second-hand instead of new, among others. The findings of this research show that changing consumption habits (by consuming less and/or reducing the environmental impact of consumption in different areas of life) could contribute to individual wellbeing, while also contributing to the wellbeing of the planet [5].

However, the positive relationship between sustainable consumption and wellbeing is not found consistently across studies. Some have found a nonsignificant link between happiness and specific sustainable consumption practices. For example, according to a study conducted by Jacob et al. [33] with a sample of members of a Buddhist fellowship, there is a positive relationship between subjective wellbeing and sustainable food purchases, while recycling behavior and sustainable household choices are not statistically significant. The research by Schmitt et al. [8], using a sample from Canada and the United States, finds that 2 out of the 39 PEBs analyzed are not significantly related with life satisfaction. These two behaviors were related to the use of public transit or carpool and running the washer or dryer only when full. In a similar vein, Suárez-Varela et al. [34] focus on actions aimed at water saving and, using data from Spain, show that only the installation of water-saving technologies is positively related to happiness, with water-saving behaviors being insignificant. For their sample from the UK, Binder and Blankenberg [3] find that PEB, as measured by participation in 11 sustainable consumption practices, does not have a statistically significant impact on life satisfaction. Similarly, Guillen-Royo [4] analyzes a representative sample of the Norwegian population and finds that, after controlling for psychological and lifestyle factors, participation in sustainable consumption practices is significantly associated only with the eudaimonic dimension of subjective wellbeing.

Few studies have found a negative link between wellbeing and sustainable consumption patterns. Binder et al. [9], using a sample of students from the University of Granada, Spain, report a negative relationship between life satisfaction and an index of PEBs composed mainly of sustainable consumption practices. Likewise, for a sample from Flanders, Verhofstadt et al. [10] found that specific environmentally friendly choices (namely, limited meat or fish consumption, living in a small apartment or house, not having or not using a car and spending holidays at home or nearby) correlated negatively with life satisfaction.

### 2.1.2. Environmental Activism and Subjective Wellbeing: The Collaborative Level

Collaborative PEBs involve joining others in organizing actions ranging from conventional activist initiatives, such as starting a petition, to high-risk activities, such as blocking roads or occupying public spaces [12]. Engaging in political activism, which includes environmental action, has generally been considered a wellbeing-enhancing activity. This reflects the traditional association of activism with volunteering, and latter is found to be positively associated with measures of subjective wellbeing in both cross-country [35,36] and within-country studies [37,38].

The reasons why activism or volunteering are expected to generate higher levels of wellbeing are manifold. Studies find that that expressing an interest in the welfare of others and caring about them is positively associated with several measures of affective and eudaimonic wellbeing [39,40]. This might be linked to the fact that acts of volunteering could be driven by the pursuit of intrinsic goals such as community feeling, which is traditionally associated with high levels of psychological need fulfilment, happiness or affective wellbeing and life satisfaction [41]. It might also relate to the fact that engaging in altruistic behavior provides opportunities to socialize and acquire new knowledge and skills, which contribute to meeting the three psychological needs for competence, autonomy, and relatedness, and also increase life satisfaction [36,42].

Not all factors that drive volunteering and pro-environmental activism are of an altruistic nature. Binder and Blankenberg [38] suggest that the reasons why people engage in volunteering might well be of an egoistic nature, as some see it as a way to advance their career, increase their status, or enhance their self-esteem. The authors find that selfish concerns, such as those related to job security, the economy and personal finances, have a negative impact on life satisfaction but that volunteering attenuates this negative effect. They also find that although being concerned about the environment increases life satisfaction and the propensity to volunteer and become a member of an environmental organization, it does not increase the likelihood of participating in local political initiatives. This suggests that volunteering and activism might have some conceptual differences worth investigating.

Klar and Kasser [13] maintain that volunteering is a broad term encompassing activities that do not necessarily involve advocacy, which is a defining trait of activism. Activism itself is not a homogenous concept either, as empirical studies indicate a clear-cut split between conventional activist behaviors, such as sending letters to elected representatives or fundraising, and high-risk behaviors, such as blocking access to a building with one's body [12]. In a study using a sample of college students and one of activists, Klar and Kasser [13] found that conventional activist behaviors were significantly correlated with measures of subjective and eudaimonic wellbeing, but that this was not the case for high-risk activism. Among the likely explanations, the authors mentioned that "it may be that this group feels a greater sense of injustice and hopelessness, which not only makes them less happy but impels them to more extreme activist behaviors including illegal ones" [13] (p. 773).

## 2.2. Connectedness to Nature, Pro-Environmental Behavior, and Subjective Wellbeing

There are different interpretations of the concept of connectedness to nature in the literature. For Schultz [18] (p. 67), connectedness to nature refers to "the extent to which an individual includes nature within his/her cognitive representation of self". In contrast, Mayer and Frantz [19] understand this concept as an affective and experiential connection of an individual with nature. Linking both interpretations, Geng et al. [43] define connectedness to nature as an individual's feelings about connections with nature and belongingness to nature, from both an emotional and a cognitive perspective. Connectedness to nature is a key variable in our study and there is evidence that it is positively related to PEBs and wellbeing. In fact, it has been shown that connectedness to nature could play a similar, or even more important, role than some socio-demographic factors in the link between wellbeing and the adoption of PEBs [20].

Extant literature suggests that connectedness to nature encourages pro-environmental attitudes and behaviors [19,22,23,26,43]. It is argued that when individuals feel part of nature, they are less likely to harm it, since damage to the environment would be considered as damage to themselves [19]. As such, connectedness to nature might provide an intrinsic motivation to adopt more ecological behaviors, and this motivation is found to last throughout a person's life [27]. In addition, links with nature have been found to be positively associated with both effortless and more demanding ecological behaviors [14,20,44–46]. In the same way, the loss of connection with nature could explain the deterioration of the environment. In this sense, Soga and Gaston [47] argue that the decline in individuals' emotional connection, along with reduced opportunities to experience nature directly, discourages positive emotions, attitudes and behaviors related to the environment, creating a cycle of disaffection.

The human-nature link is not only good for nature conservation, but also for people's wellbeing, as connectedness to nature has been found to predict many indicators of wellbeing, encompassing both hedonic and eudaimonic wellbeing [19–21,24,25,48–50]. The sense of kinship, egalitarianism, embeddedness and belongingness associated with a strong connectedness to nature is believed to contribute to high levels of wellbeing [19]. Similarly, the innate affinity that human beings feel for nature and other forms of life often translates into positive emotions when they find themselves in the natural environment [24,48]. Furthermore, Mayer et al. [25] highlight the possibility that people gain purpose



and meaning in life through an experiential sense of belonging to the natural world. Connectedness to nature appears to be a key factor contributing to positive psychological functioning [21].

Furthermore, connectedness to nature has been shown to be a mediating factor in a number of different relationships; for example, between exposure to nature and positive affect [25], environmental education and vitality [24], mindfulness and PEBs [26] or nature-based environmental education and ecological behavior [27]. Recently, Martin et al. [20] have tested the moderating role of connectedness to nature in the relationship between nature contact and some measures of wellbeing and PEB. However, this construct has never been analyzed as a moderating factor in the relationship between PEBs and wellbeing, as we do in this research.

### 2.3. The Present Study

The literature review above suggests that there are still important contributions to be made to the literature on the PEBs-wellbeing relationship. Firstly, the possible differences between the relationship of sustainable consumption with wellbeing and that of activism with wellbeing remain unexplored. These differences are worth examining as the two kinds of PEBs have different implications for social structure. Secondly, even though connectedness to nature is found to be positively related to PEBs and wellbeing, no evidence has been reported to date on the role of connectedness to nature as a moderator in the PEBs-wellbeing relationship. In an attempt to address this research gap, in this paper we propose the following hypotheses (see also Figure 1):

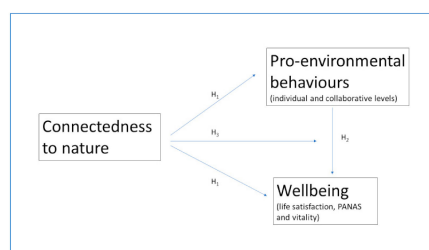


Figure 1. Study hypotheses.

**Hypothesis 1.** *Connectedness to nature is positively associated with both PEBs and wellbeing.*

**Hypothesis 2.** *Individual and collective PEBs are both positively associated with wellbeing, but there are differences in regard to their relationship with the three dimensions of wellbeing.*

**Hypothesis 3.** *Connectedness to nature strengthens the positive relationship between PEBs and wellbeing.*

The first hypothesis stems directly from the literature on connectedness to nature [14,20–22,44,49,50]. The second hypothesis is established in order to answer the first research question: Are there differences between individual and collective PEBs in their relationship with wellbeing? This hypothesis allows us to evaluate the difference between individual and collective PEBs in their relationship with wellbeing, an issue which has yet to be explored. The third hypothesis deals with the possibility that connectedness to nature acts as a moderator in the relationship between PEBs and wellbeing, which has not been examined in the literature to date. It is aimed at answering the second research question: What role does connectedness to nature play in the relationship of wellbeing with individual and collective PEBs? Hypothesis 3 draws on the fact that feeling connected to nature, and acting to protect it through sustainable consumption practices and activism, might lead individuals to experience higher levels of choice and autonomy over their behaviors, thereby facilitating more persistent and higher quality motivation and increased wellbeing [5]. Thus, we would expect that people who see themselves as part of nature might experience higher levels of wellbeing, as they engage in more individual and collaborative PEBs than their less connected counterparts. We considered connectedness to nature as a moderator,

i.e., a variable ‘that changes the size and/or the direction of the relationship between two variables’ [51] (p. 1026), rather than exploring the idea of mediation (concerning the possibility that connectedness to nature explains the positive relationship between PEBs and wellbeing) because the latter would assume that consuming more sustainably or engaging in environmental activism predicts a higher connectedness to nature, which to the best of our knowledge is not supported by the literature on the topic.

The analysis takes into account the cognitive, affective and eudaimonic dimensions of wellbeing to answer the two main questions in this research: (1) Whether there are differences between consuming sustainably (individual PEBs) and engaging in environmental activism (collaborative PEB) in regard to their relationship with the three dimensions of wellbeing. (2) Whether the extent to which connectedness to nature modifies the relationship between PEBs and wellbeing varies across PEB types and wellbeing dimensions.

### 3. Materials and Methods

#### 3.1. The Fieldwork

In this research, we used a new database comprising 1283 students from different faculties and disciplines, such as economics, sociology, social work and environmental studies, at the University of Granada, Spain. The fieldwork was undertaken during the months of March and April 2019. A research team visited classrooms and provided students with the questionnaire, which was accessible online via Qualtrics. Students did not receive any payment for filling in the questionnaire. After deleting missing values and 5 observations that made no sense, the final sample was left with 973 observations.

#### 3.2. The Variables

To evaluate the subjective wellbeing of individuals we used 3 indicators: life satisfaction (cognitive dimension), positive and negative emotions (affective dimension) and subjective vitality (eudaimonic dimension). Life satisfaction is related to the cognitive assessments and judgments people make about their life [52]. We measured the variable *lifesat* through the question “How satisfied are you at this moment with your life as a whole?” Survey participants answered the question using an 11-point Likert scale ranging from 0 (completely dissatisfied) to 10 (completely satisfied).

The affective component of wellbeing was captured through the Positive and Negative Affect Schedule (PANAS) proposed by Watson et al. [53]. PANAS is composed of 20 items describing different feelings and emotions, 10 positive affections (motivated, alert, excited, inspired, strong, determined, attentive, enthusiastic, active, proud) and 10 negative affections (irritable, annoyed/upset, embarrassed, angry, nervous, guilty, fearful, aggressive, restless, insecure). For each item, the individuals indicated how they had felt during the last 7 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* was calculated as the difference between the sum of the positive affection scores and the sum of the negative affection scores. Regarding the reliability of this measure, the Cronbach’s alpha of 0.86 confirmed its internal consistency.

Finally, we used the Subjective Vitality Scale developed by Ryan and Frederick [28] to reflect the eudaimonic dimension of wellbeing. Subjective vitality can be defined as the conscious experience of possessing energy and vivacity, and is considered an aspect of eudaimonic wellbeing because it is part of being in a state of full psychological and physical functioning [4,28]. The Subjective Vitality Scale (the variable *vitality*) was calculated as the arithmetic mean of the scores given to 6 statements related to feeling vital: “I feel alive and vital”; “Sometimes I feel so alive I just want to burst”; “I have positive energy and spirit”; “I get excited every new day”; “I nearly always feel alert and awake”; “I feel energized”. The answers to each statement are scored on a 5-point scale (1 = Totally false; 2 = Not so true; 3 = Somewhat true; 4 = Fairly true; 5 = Extremely true). The vitality scale had a Cronbach’s alpha of 0.87, confirming its internal consistency.

We captured PEBs by using a sustainable consumption index, and a variable indicating the frequency of political participation in demonstrations supporting the environment. In order to capture

sustainable consumption, we asked individuals to score the degree with which they perform several actions. Those actions were: “turn off lights in rooms that are not being used”; “put on more clothes when it’s cold at home, instead of turning on or raising the heating level”; “decide not to buy something because it has an excess of packaging”; “buy recycled products such as toilet paper or recycled tissues”; “carry your own shopping bag”; “separate the rubbish, for example, paper, plastic, glass”; “use public transport (e.g., bus, train) instead of using the car”; “walk or cycle for short distances (up to about 3–4 km)”; “take fewer planes when possible”; “reduce consumption of meat or animal products”; “buy organic or eco-labelled food”; “buy organic or eco-labelled products (furniture, clothing)”; “preference for buying local products”; “throw away food”; “in general, try to reduce consumption in everyday life”. Participants indicated how engaged they were in these behaviors “very slightly or not at all” (1), “a little” (2), “moderately” (3), “quite” (4), or “extremely” (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 “Throwing food away” so that high scores denote environmentally friendly behavior in all cases. Based on these responses, we calculated the variable *sustconsumption* as the mean of the scores obtained in the different behaviors. To calculate this average, the sum of the scores was divided by the number of behaviors to which the individual responded, such that the overall score was not affected if one of the behaviors was not applicable to the individual. The sustainable consumption index had a good level of internal consistency (Cronbach’s alpha of 0.78).

The questionnaire used the same scale for respondents to rate the frequency with which they participate in demonstrations in support of the environment (*activism*). This last variable was a proxy for activist engagement.

Another central variable in this research is connection to nature, for which we used the proxy of the connectedness to nature scale [19]. This scale comprises 14 items referring to an individual’s relation with nature: “I often feel a sense of oneness with the natural world around me”; “I think of the natural world as a community to which I belong”; “I recognize and appreciate the intelligence of other living organisms”; “I often feel disconnected from nature” (reverse scored); “When I think of my life, I imagine myself to be part of a larger cyclical process of living”; “I often feel a kinship with animals and plants”; “I feel as though I belong to the Earth as equally as it belongs to me”; “I have a deep understanding of how my actions affect the natural world”; “I often feel part of the web of life”; “I feel that all inhabitants of Earth, human, and nonhuman, share a common ‘life force’”; “Like a tree can be part of a forest, I feel embedded within the broader natural world”; “When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature” (reverse scored); “I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees”; “My personal welfare is independent of the welfare of the natural world” (reverse scored) [19]. People replied to these items on a 5-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). The *connectedness* to nature scale was calculated by averaging the score of all items, with reverse scoring in some items as applicable. The Cronbach’s alpha for this scale was 0.84, indicating its internal consistency.

In order to test the hypotheses in Section 2.3, in addition to the main variables of wellbeing, PEBs and connectedness to nature, we included a set of control variables in the analysis, capturing respondents’ personal information. In the survey, participants indicated their parents’ monthly income by selecting 1 of the 8 intervals given as an option, with the lowest category being less than EUR 499 and the highest being EUR 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 EUR 6000). We calculated per capita income by dividing the amount by the number of people living in the household and we applied the natural logarithm to consider the decreasing marginal utility of income [54]. In addition, in the analysis we considered *age* in years as specified by respondents, and we also incorporated the variable  $age^2$ . Respondents indicated their *gender* selecting male (1), female (2) or other (3), and we included a dummy equaling 1 if the individual reported being *female*. We introduced the *single* variable if the individual was not in a stable relationship. The variable *relationships* provided information about



the social life of the respondents. They were asked about the frequency with which they are in touch with their relatives, friends and neighbors on a scale from never (1) to every day or almost every day (5). We calculated the variable as the average of the scores obtained in the 3 items (family, friends and neighbors). Individuals described their health status by selecting one of the following categories: no problems (3), mild problems (2), moderate problems (1) and major problems (0). Finally, the variable *work* was a dichotomous variable that indicated whether the respondent works (1) or not (0).

### 3.3. Method of Analysis

To examine the relationship between PEBs (sustainable consumption and activism) and wellbeing (H2), we used regression analysis (ordinary least squares, OLS), which allowed us to determine both the nature and strength of the relationship between these 2 variables. In all analyses, we specified a different model for each dimension of wellbeing (life satisfaction, emotions and vitality), with the wellbeing variables as the dependent variables of the model. We tested H1 using bivariate Pearson correlations. Finally, we again used regression analysis to test H3, incorporating interaction terms. The interactions were between sustainable consumption and connectedness to nature, as well as the activism variable and connectedness to nature. In order to avoid high variable inflation factors in the analysis that condition the results, the interaction variables were mean corrected; that is, we constructed the interactions using the variables that interact by subtracting their mean value [55]. Again, we specified a different model for each dimension of wellbeing, which were the dependent variables.

Linear regression analysis was the most suitable method for the variables of *emotions* and *vitality* for testing H2 and H3, since they were quantitative variables. In contrast, given the ordinal nature of the variable *lifesat*, it may have been more appropriate to use an ordered probit or logit model. However, we applied OLS because the results were easier to interpret with this method. Additionally, the results obtained with both methods are very similar [56]. In any case, in order to provide more evidence, we repeated the analyses of life satisfaction using an ordered probit technique, arriving at similar results and conclusions about the relations of the key variables. Data analysis was performed using Stata15 statistical software. The general specification of the equation estimated in this study is as follows:

$$SWB_i = f(PEBs_i, connat_i, interactions_i, X_i), \quad (1)$$

where  $SWB_i$  stands for the 3 measures of subjective wellbeing,  $PEBs_i$  refers to the sustainable consumption index and the *activism* variable for testing H2,  $connat_i$  is the connectedness to nature index whose inclusion together with that of  $interactions_i$  allows us to test H3.  $X_i$  is a vector of variables that includes all control variables and is used in all regressions.

In terms of the control variables included in the analysis, we expected income to have a positive, though not very strong, relationship with subjective wellbeing. For age, we assumed a U-shaped wellbeing curve: younger and older people have higher levels of wellbeing, while lower levels occur in middle age. For gender, we could not anticipate the relationship with subjective wellbeing, because the evidence was not clear. We believed that being single and having health problems both had a negative relationship with wellbeing. Conversely, we expected that socializing with family, friends and neighbors was positively associated with wellbeing. Finally, although having a job is often associated with higher levels of wellbeing, it was not clear whether it would be in this case, due to the fact that the respondents are students.

## 4. Results

We begin with a descriptive analysis of the variables used in the regression analysis (Table 1). The mean value of sustainable consumption is higher than that of activism, which means that, on average, people are more likely to engage in PEBs relating to consumption practices than to participate in pro-environmental protest. Approximately 60% of the sample are women, a similar percentage reports being single, around a quarter of people work as well as study, and the average age

is 20 years. The average of the variables related to health and relationships are nearer to the maximum value than to the minimum. The same is true of the wellbeing variables.

**Table 1.** Descriptive statistics.

	Mean/%	Std. Dev.	Min	Max
Subjective wellbeing				
<i>lifesat</i>	7.031	1.698	1	10
<i>emotions</i>	7.992	11.0	−25	35
<i>vitality</i>	3.309	0.738	1	5
Pro-environmental behaviors (PEBs)				
<i>sustconsumption</i>	3.015	0.611	1.133	4.866
<i>activism</i>	1.864	1.193	1	5
Moderator variable				
<i>connectnature</i>	3.319	0.639	1.3571	5
Control variables				
<i>income</i>	6.191	0.796	3.218	8.699
<i>age</i>	20.7	2.812	18	54
<i>age<sup>2</sup></i>	436.5	146.7	324	2916
<i>female</i>	62.2%		0	1
<i>single</i>	63.2%		0	1
<i>relationships</i>	3.481	0.754	1	5
<i>health</i>	2.435	0.679	0	3
<i>work</i>	25.4%		0	1

Table 2 shows the Pearson correlation coefficients between the two types of PEBs, connectedness to nature and wellbeing dimensions. The three subjective wellbeing measures are significantly correlated with each other, with a Pearson correlation between 0.5–0.62 and a  $p$ -value lower than 0.01. However, the two types of PEBs do not significantly correlate with each other, with a correlation lower than 0.5. Sustainable consumption positively correlates with vitality ( $r = 0.077$ ,  $p < 0.05$ ) and activism negatively correlates with life satisfaction ( $r = -0.09$ ,  $p < 0.01$ ), results that are in line with those presented in Table 3 below. Connectedness to nature is positively related to all wellbeing and PEBs variables, with  $p$ -values lower than 0.01 in all cases. This supports H1, which posits a positive relationship between connectedness to nature, PEBs and wellbeing in our student sample.

Table 3 presents the results of the OLS estimations for testing H2 using the three wellbeing variables as the dependent variables for the different model specifications, and including the PEBs and the control variables. The sustainable consumption index is positively related to the eudaimonic dimension of wellbeing ( $b = 0.094$ ,  $p < 0.05$ ), but is not significantly associated with the cognitive and affective dimensions. Contrary to our expectations, activism is negatively associated with life satisfaction ( $b = -0.155$ ,  $p < 0.01$ ) and is not significantly related to the other wellbeing dimensions.

Regarding the control variables, as we expected, we found a positive association between the *relationships* and *health* variables and all dimensions of wellbeing. In contrast, the relationship between the other variables and wellbeing depended on the dimension considered. Income was positively related to emotions and vitality. Age was also positively associated with vitality. Being a woman was negatively associated with the affective dimension of wellbeing, while being single was negatively associated with the cognitive dimension.

Finally, in Table 4 we present the results of testing H3 by including the connectedness to nature index in the empirical model, and the interactions of this variable with the two PEBs variables.

The coefficient of the connectedness to nature index appears to be highly significant ( $p < 0.001$ ) in all models estimated. Engaging in environmental activism is negatively related to life satisfaction, as in the estimations from Table 3, but the coefficient of the sustainable consumption variable is not

significant when adding the interactions. The interaction between activism and connectedness to nature is positively related to life satisfaction; therefore, the marginal influence of being activist on life satisfaction is dependent on connectedness to nature. By setting the derivative equal to zero, a critical value of connectedness to nature of 4.53 (on a 1–5 scale) can be calculated. This means that if individuals experience a very strong connection to nature (greater than 4.53), then the marginal effect of activism on life satisfaction turns positive.

The control variables are included in the estimations but not depicted in the table, as the coefficients are similar to those from Table 2.

**Table 2.** Correlation (Pearson) of pro-environmental behaviors and wellbeing measures.

	<i>Lifesat</i>	<i>Emotions</i>	<i>Vitality</i>	<i>Sustconsumption</i>	<i>Activism</i>	<i>Connectnature</i>
<i>lifesat</i>	1					
<i>emotions</i>	0.556 **	1				
<i>vitality</i>	0.501 **	0.621 **	1			
<i>sustconsumption</i>	−0.014	0.043	0.077 *	1		
<i>activism</i>	−0.090 **	0.016	0.039	0.478	1	
<i>connectnature</i>	0.094 **	0.137 **	0.201 **	0.369 **	0.276 **	1

\* means statistically significant at 5%, and \*\* means statistically significant at 1%

**Table 3.** Wellbeing and pro-environmental behaviors.

	<i>Lifesat</i>	<i>Emotions</i>	<i>Vitality</i>
<i>sustconsumption</i>	0.0801 (0.098)	0.906 (0.667)	0.094 * (0.042)
<i>activism</i>	−0.155 ** (0.051)	−0.067 (0.327)	−0.007 (0.022)
<i>income</i>	0.090 (0.063)	0.990 * (0.424)	0.054 * (0.027)
<i>age</i>	−0.025 (0.063)	0.054 (0.437)	0.0562 * (0.027)
<i>age</i> <sup>2</sup>	0.001 (0.001)	0.003 (0.006)	−0.001 (0.001)
<i>female</i>	0.083 (0.107)	−1.703 * (0.707)	−0.063 (0.046)
<i>single</i>	−0.468 ** (0.105)	−1.238 (0.713)	−0.025 (0.045)
<i>relationships</i>	0.385 ** (0.072)	2.933 ** (0.463)	0.297 ** (0.031)
<i>health</i>	0.608 ** (0.079)	3.383 ** (0.517)	0.217 ** (0.032)
<i>work</i>	−0.056 (0.126)	0.001 (0.845)	0.018 (0.050)
<i>constant</i>	4.224 ** (1.072)	−20.1 ** (7.080)	0.359 (0.456)
F	13.38	12.75	19.66
R <sup>2</sup>	0.128	0.114	0.163
N	973	973	973

Robust standard errors in parentheses. All models are statistically significant at 1%. \*\*  $p < 0.01$ , \*  $p < 0.05$ .

**Table 4.** Wellbeing and pro-environmental behaviors, including interactions with connectedness to nature.

	<i>Lifesat</i>	<i>Emotions</i>	<i>Vitality</i>	<i>Lifesat</i>	<i>Emotions</i>	<i>Vitality</i>
<i>sustconsumption</i>	−0.013 (0.105)	0.268 (0.689)	0.033 (0.044)	0.001 (0.102)	0.274 (0.678)	0.037 (0.044)
<i>activism</i>	−0.176 ** (0.051)	−0.203 (0.329)	−0.020 (0.021)	−0.202 ** (0.052)	−0.192 (0.326)	−0.024 (0.021)
<i>connectnature</i>	0.274 ** (0.094)	2.124 ** (0.591)	0.193 ** (0.041)	0.258 ** (0.093)	2.127 ** (0.597)	0.190 ** (0.041)
<i>mcsustcon * mcconnat</i>	0.144 (0.133)	0.075 (0.831)	0.042 (0.055)			
<i>mcactivism * mcconnat</i>				0.166 * (0.066)	−0.047 (0.410)	0.030 (0.028)
F	11.68	11.75	19.12	12.33	11.80	19.50
R <sup>2</sup>	0.138	0.126	0.186	0.143	0.126	0.186
N	973	973	973	973	973	973

Robust standard errors in parentheses. All models are statistically significant at 1%. \*\*  $p < 0.01$ , \*  $p < 0.05$ .

## 5. Discussion, Future Research, and Limitations

This research used an original dataset comprising 973 students from the University of Granada in Spain to study the relationship between individual and collaborative PEBs and wellbeing. It explored the connection of PEBs with three aspects of wellbeing; the affective, cognitive and eudaimonic dimensions.

In sum, our results indicate that (1) there is a positive correlation between connectedness to nature and all five indicators capturing PEBs and wellbeing, thus supporting H1. Regression analysis confirmed that sustainable consumption is directly related to the Subjective Vitality Scale, although it is not significantly related to life satisfaction and affect. The study also indicated that (2) individual and collaborative PEBs might differ in their relationship with wellbeing. We found activism to have a negative link to life satisfaction and a not significant association with affect and vitality. These findings suggest we should reject H2, which posits a positive association between PEBs and wellbeing. Additionally, we found that (3) when introducing connectedness to nature in the wellbeing regressions, the negative association between pro-environmental activism and life satisfaction turns positive, but only for those with a very strong connection to nature. The interaction effect is not significant concerning individual PEBs, however, which does not support H3.

The findings of this study contribute to the literature on PEBs and wellbeing in several ways. Firstly, the not-significant relations found between sustainable consumption and several wellbeing measures indicate that the wellbeing dividend (gaining in wellbeing while conserving and enhancing the natural environment), as defined by Jackson [11], may not be present across socio-economic, cultural or demographic groups. Some previous studies have suggested the same. For instance, a negative relationship between PEBs and life satisfaction was found in previous research for students from Granada drawn from a different sample [9], but a positive relationship was found among US high school students [7]. Another example is the not-significant relation between happiness and recycling found among Buddhists in the US [33], while Schmitt et al. [8] found a significant relationship between life satisfaction and recycling for a sample of people in Canada and the US. The fact that different social groups and different cultures present differences in how engaging in PEBs is associated with happiness could form the basis of a hypothesis to be explored in future research.

Secondly, the negative association between participating in pro-environmental demonstrations and life satisfaction seems to contradict previous literature, unless joining pro-environmental protests in Granada is considered high-risk activism. In the context of this research, the authors have had informal conversations with several activists and members of grassroots organizations. In general, they consider participating in marches or demonstrations to be a low-risk activity in Granada, as risks for human security or freedom seem to be minimal. The literature is still scarce on the relationship between

environmental activism and wellbeing, but existing studies point to a positive relationship between low-risk activism and most dimensions of wellbeing [13]. This suggests that more research is required to understand the implications of becoming involved in collaborative PEBs as an undergraduate student in this Southern European city. Conducting in-depth interviews with activist students appears to be a good way forward.

The study found that the negative relationship between participating in protests and life satisfaction is reversed for people who identify themselves as highly connected to the natural environment. This group might feel that the opportunity to express their connection to nature through collaborative endeavors, such as participating in marches and demonstrations, reduces the need to resign themselves to a situation of environmental degradation. The perception that they might be able to contribute to structural change could increase their feelings of autonomy and control over their own actions. Following Self-Determination theory, higher levels of autonomy contribute to higher psychological need satisfaction and subjective wellbeing [57].

Thirdly, connectedness to nature seems to play an important role in explaining care for the environment and individual wellbeing, as it is significantly and positively correlated with all measures of PEBs and the three dimensions of wellbeing. The importance of this variable, in terms of its positive correlations, and the fact that it turns the negative relationship between activism and life satisfaction into a positive one, suggests that it might play an important role in generating win-win situations characterized by higher levels of wellbeing and lower environmental impact. In this respect, our results are in line with previous literature claiming that people who experience a high level of connectedness to nature achieve the wellbeing dividend [19,20].

Finally, some limitations of the research design need to be addressed. Firstly, as is the case in many other studies on the connection between PEBs and wellbeing, we use a convenience sample. As such, we cannot be sure that the students included in our study are representative of the whole University of Granada or the student population in general. Secondly, the sample is adequate for statistical analysis, but a greater sample size and an attempt to represent the whole spectrum of university students would be ideal. Thirdly, as we work with cross-sectional data, causality cannot be asserted. This is why we discuss relationships in terms of associations between variables, and not in terms of causal impacts. Fourthly, our indicator of environmental activism leaves room for improvement: it is based on a question on participation in pro-environmental demonstrations and could be enriched by including other dimensions of activism. Pro-environmental activism could involve different types of actions; from collecting signatures to demanding stricter recycling laws to blocking roads and accesses to public buildings. We believe that including measures of different types of activism to capture the time, effort and personal risk they entail would enrich future studies on the topic. Additionally, the potential causality between activism and wellbeing should be researched in the future, provided that there is panel data to implement the analysis.

## 6. Conclusions

This paper posed the following research questions: Are there differences between individual and collective pro-environmental behaviors (PEBs) in their relationship with wellbeing? What role does connectedness to nature play in those relationships? Exploring these questions represents a novel contribution to the literature, where, as to the best of our knowledge, it has not been addressed in previous research. We have considered three dimensions of wellbeing—cognitive, affective and eudaimonic—and two conceptualizations of PEBs—individual actions (sustainable consumption) collaborative actions (pro-environmental activism). No related studies to date have examined the different dimensions of wellbeing and/or pro-environmental behaviors, so our study is the first to add such depth in the understanding of their relationship. In addition, despite the role of connectedness to nature having previously been explored in connection with wellbeing and/or PEBs, it has never been analyzed as a moderator in the PEBs-wellbeing relationship, with the present study being the first to undertake such a rich exploration.



In order to answer the questions proposed in this research, we drew on a sample comprising 973 university students to explore the relationship between PEBs and wellbeing. Results indicate that individual PEBs are positively related to eudaimonia and that pro-environmental activism, our measure for collaborative PEB, is negatively related to life satisfaction. Other relationships are found to be non-significant. We included a connectedness to nature index in order to ascertain its possible moderating role in the PEBs-wellbeing relationship. Results indicated that connectedness to nature is positively associated with individual and collaborative PEBs and all wellbeing dimensions. In addition, it moderates the life satisfaction-activism relationships; when connectedness to nature is included, the negative association between activism and life satisfaction becomes positive for those declaring a very strong connection to nature. This suggests that feeling highly connected with the natural environment might be a key factor in the societal quest to achieve the wellbeing dividend.

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