Environmental related actions and awareness:

The relation with subjective well-being

Marta Suárez-Varela[*], Jorge Guardiola[**], Francisco González-Gómez[***]

[*] Departamento de Estructura Económica, Avenida de los naranjos s/n, 46022 Valencia, Spain. E-mail: mrtasvm@gmail.com
[**] Departamento de Economía Aplicada and Instituto Universitario del Agua, Campus de Cartuja s/n, Universidad de Granada, 18071 Granada, Spain. E-mail: jguardiola@ugr.es
[***] Departamento de Economía Aplicada and Instituto Universitario del Agua, Campus de Cartuja s/n, Universidad de Granada, 18071 Granada, Spain. E-mail: fcojose@ugr.es

Abstract

In this paper we study the influence of both environmental awareness and behaviors on subjective well-being (SWB). By using ordered logit techniques in a sample of Granada, a city in Southern Spain, we find that concern about the environment and voluntary work actions to preserve it are relevant for SWB. When both are combined, namely when a person is concerned and volunteers at the same time, the influence on SWB is greater. These results introduce the SWB dimension in the knowledge-concern-action paradox, which states that even if the individual is concerned about the environment, this concern does not always translate into personal action to preserve it. Actions such as habits related to water saving inside the household are not significant in explaining SWB, but using devices or infrastructures that save water increases it. In summary, our results suggest that actions and awareness have either a positive or no significant influence on SWB, but never a negative influence. Those results have implications on policy making, as promoting and caring for the environment in different combinations enhance SWB by different degrees.

Keywords: Subjective well-being; Environmental actions; Environmental Awareness

Environmental related actions and awareness:

The relation with subjective well-being

1. Introduction

The subjective well-being (SWB) literature intends to explore the determinants of people's happiness. In economics, this literature aims to elucidate the relationship between a number of significant economic issues and SWB in order to implement public policies that improve people's lives (Veenhoven 2002, Frey and Stutzer 2002a). Research into the connection between SWB and other variables related to the physical environment or the individual's response to environmental features is a substantially more recent subject of study. Helping to disentangle this relationship is crucial for the development of environmental policies that have the necessary support and can be implemented successfully at a citizen level. The recognition of this fact by ecological economists has resulted in the emergence of a new approach to model individual's self-reported happiness in terms of environmental conditions, referred to as the "happiness approach" (Welsch 2002). Research in this area is still blooming and there is not yet enough certainty about the direction and strength of the influence these environmental features exert on SWB, and which variables mediate this effect.

Concerning environmental studies, the question of whether environmental awareness and concern is translated into action to preserve the environment is of great relevance with respect to policy implications. This gap between awareness and action is known as the knowledge-concern-action paradox (Lenzen and Cummins 2011), and existing research into it gives support to the claim that concern is not normally related to action. It seems that the more the individuals know about climate change and other facts regarding environmental degradation, the more concerned they are about it. However this concern does not always translate into personal actions or a reduction in the individual's environmental impact (Lenzen and Cummins 2011).

Actions related to the environment have occasionally been analyzed in a cost-benefit scenario, referring to a self-sacrifice effect. If the individual follows a cost-benefit logic when assessing the impact of their environmental behavior, then it could be argued that that the effect of these behaviors on SWB will depend on the net impact of the costs and benefits involved. Such

costs are not only expressed in monetary terms but also relate to time or psychological costs, whilst the benefits are more psychologically related, such as satisfaction or self-realization. In this context, self-sacrifice logic seems to be overcome by evidence indicating that pro-environmental actions increase SWB. Along similar lines, some research has suggested that concern relates to intrinsic motivation rather than extrinsic goals (Kollmus and Agyeman 2002), and intrinsic motivation raises the SWB of people who perform pro-environmental actions (Brown and Kasser 2005) or do voluntary work in general (Meier and Stutzer 2008). This suggests that intrinsic values may be the key to understanding the causes of the translation between awareness and behavior.

Within this context, this study builds on the environmental and SWB literature by assessing the influence of both environmental awareness and action on SWB in the background of the knowledge-concern-action paradox. To our knowledge, there are no previous studies that simultaneously empirically examine the importance on SWB of those two environmental features that have been clearly distinguished in the previous literature, and account for the above mentioned paradox in utility terms. In order to implement this research, we perform an empirical analysis using a representative sample of Granada, a city in the south of Spain with 239,000 inhabitants, from which we obtain data on sociodemographic variables such as income, age, unemployment and gender, as well as data on questions related to individuals' awareness, action, and their SWB.

The remainder of this research paper is structured as follows. Section 2 presents an overview of the economic literature relating to the determinants of SWB, specifically those studies that have attempted to link happiness with environmental factors. Section 3 presents the data and methods used in the empirical analysis. Section 4 discusses the results and section 5 concludes with a discussion.

2. Literature review

Since the seminal work of Richard Easterlin (1974), that for the first time examined the relationship between economic growth and happiness, interest in SWB by Economists has been increasing, and this research into SWB has been particularly acute during the past two decades. The SWB approach as a proxy for utility is supported by the claim that the best way to determine people´s satisfaction with their own life is by asking them directly (Veenhoven,

1991; Veenhoven, 1996). The individuals are normally asked, generally speaking, how happy they are with their life as a whole, and are requested to reply in verbal categories, usually on a scale of four, seven or eleven, from "very or extremely unhappy" to "very or extremely happy". These categories are considered to be ordinal, allowing for interpersonal comparability (Van Praag, Frijters and Ferrer-i-Carbonell 2003). In many studies, the question of happiness is replaced by one in which individuals are asked how satisfied they are with their lives. This is due to the fact that the terms "life satisfaction", "happiness" and "subjective well-being" are usually used as synonyms. Although conceptually they are interpreted to be different (Diener el al. 1999), considering them as equivalent is in part justified by the high correlation between the responses to the questions in which individuals are asked respectively how happy and how satisfied they are (Blanchflower and Oswald 2004).

Economics has incorporated SWB measures to fields or issues such as unemployment (Oswald 1997, Clark and Oswald 1994, Helliwell 2003), inflation (Di Tella, MacCulloch and Oswald 2001, Kalyuzhnova and Kambhampati 2008), inequality (Alesina, Di Tella and MacCulloch 2004), democratic institutions (Frey and Stutzer 2000) and health (Groot, 2000). Even though the adoption of SWB as a proxy for the utility of individuals is commonplace in those fields, the use of self-rated utility in Ecological Economics is still ongoing, as the connections between environment and measures of SWB have not yet been sufficiently explored (Ferrer-i-Carbonell and Gowdy 2007, Welsch 2006).

There exists, nevertheless, a whole body of research in other disciplines such as Psychology studying the relationship between environment and psychological well-being. Wilson (1984) first introduced the term "biophilia" to refer to "the urge to affiliate with other forms of life". According to him, people's psychological well-being improves by interacting with the environment. This phenomena is empirically found in several studies. For example, prisoners in cells looking at forests and farmlands needed fewer health-care services than those with a view to the prison yard (Moore 1982), and patients in a hospital in rooms whose windows looked out on a natural environment recovered faster from surgery and had fewer minor postsurgical complications than those in rooms facing a brick wall (Ulrich 1984). This idea of human's connection to nature has also been confirmed in more recent studies, such as Glenn Albrecht et al. (2007), in which the concept "solastalgia" is developed to make reference to the negative impact that environmental degradation has on people's SWB (see also Evans 2003, and Clark, Stansfeld and Candy 2006).

Those early attempts to explore the relationship between the individual and the environment set the groundwork for the examination of the link between SWB and the physical environment, which gave birth to the previously mentioned "happiness approach". Within this approach, concerning SWB and environmental degradation, some authors such as Di Tella and MacCulloch (2008) find that SWB is negatively affected by environmental degradation. Using data from around 350.000 people living in the OECD between 1975 and 1997. Welsch (2002) uses cross-sectional data from 54 countries, and identifies a negative impact of urban air pollution (measured as nitrogen dioxide levels) on SWB. Israel and Levinson (2003), in a study with cross-sectional data from 30 countries, find that an increase in per capita water pollution has a negative impact on both happiness and life satisfaction. Regarding SWB and environmental conditions, MacKerron and Mourato (2009), in a study in London, find that an improvement in environmental quality positively influences life satisfaction. They estimate that for a 10 μg/m3 increase in annual mean nitrogen dioxide concentration, life satisfaction falls by half a point on an 11-point scale.

Some other studies also use the happiness approach as a method of environmental evaluation, obtaining the willingness to pay for an improvement in environmental conditions or to avoid environmental degradation. The effects of air pollution have been explored by Welsch (2002, 2006, 2007), using measures of self-reported well-being to determine how prosperity and environmental conditions relate to it. Those studies calculate the trade-off between income and pollution to keep happiness unchanged. For instance, Welsch (2006), using data from 10 European countries for the period 1990-1997, estimates that the value determined by citizens of an improvement in air quality (measured as a simultaneous improvement in nitrogen and lead concentration) ranges from $1076 in Greece up to $3859 in Denmark. In this vein, some other research has followed this methodology to determine the monetary valuation of climate (Frijters and Van Praag 1998, Rehdanz and Maddison 2005, Ferreira and Moro 2009), drought (Carroll, Frijters and Shields 2009) and flood (Luechinger and Raschky 2007).

Two more recent applications of the happiness approach that are crucial in our research consist of the influence on SWB from people's attitudes or concern about the environment, as well as people's actions to preserve it. Concerning the former issue, Ferrer-i-Carbonell and Gowdy (2007) find that environmental awareness has a strong influence on SWB. According to them, it can affect happiness either positively or negatively. While some attitudes towards the environment with positive connotations, such as concern about biodiversity or interaction

with plants and wildlife have a positive impact on SWB, others reflecting negative environmental features such as concern about pollution have a negative influence. Some other studies confirm the existence of a negative relationship when concern is related to issues with negative implications. For instance, Rehdanz and Maddison (2008) found that concern about noise levels and air pollution had a negative effect on SWB.

The link between environmentally responsible or proenvironmental behaviors and SWB is the second field of importance in our study. Proenvironmental behaviors have been described as those that promote ecological sustainability (Brown and Kasser 2005) or at least, minimize harm to the environment as much as possible (Steg and Vlek 2009). In this line, Brown and Kasser (2005) find a positive association between environmentally responsible behavior and SWB, demonstrating that people with intrinsic value orientation and greater mindfulness, described as "awareness of ongoing internal states and behaviors", are both happier and more ecologically responsible. This is confirmed by other studies, such as those by De Young (1996, 2000), who proves that environmentally responsible behaviors provide intrinsic satisfaction, improving personal well-being.

Empirical evidence also suggests that involvement in environmental activism improves individual's well-being (Sohr 2001, Eigner 2001). In fact, the general evidence is that volunteering in any activity increases SWB. For instance, in a sample from Germany research by Meier and Stutzer (2008) demonstrates that volunteers are more satisfied with their lives than non-volunteers. Moreover, they find that volunteers oriented by intrinsic goals are more satisfied than the ones oriented by extrinsic goals, which is in accordance with the Brown and Kasser (2005) study for environmentally responsible behavior.

As we mentioned before, the successful implementation of several environmental policies is dependent on the fact that environmental awareness or concern is translated into action to preserve the environment. Existing research into this issue gives support to the claim that concern is not normally related to action. This is also known as knowledge-concern-action paradox (Lenzen and Cummins 2011), and has been widely acknowledged by a large number of studies, such as those by Blake (1999), Widegren (1998), Bratt (1999) and Stern (2000).

Numerous experiments have been conducted in order to explain the causes of this gap between awareness and action and elicit the causes that drive environmental behavior. A number of them point out the important role played by values (Stern, Dietz and Kalof 1993, Kempton 1993, Karp 1996, Stern 2000, Poortinga, Steg and Vlek 2004, Vringer, Aalberts and

Blok 2007, Ornetzeder et al. 2008). With respect to this, some authors like Kasser and Ryan (1996), distinguish between intrinsic values, which are focused on personal growth, relationships, and community involvement; and extrinsic values such as image or financial success. Moreover, intrinsic values have been identified simultaneously as a predictor of SWB (Kasser and Ryan, 1996) and environmentally responsible behavior (Brown and Kasser 2005, Kasser and Sheldon 2002, Sheldon and McGregor 2000). Another reason identified by literature is that people find it difficult to relate their own behavior (like consumption) to larger scale problems such as climate change, pollution or resource depletion (European Commission 2012). This is called external locus of control (Kollmus and Agyeman 2002), or the individual´s perception that they cannot influence the situation.

Further studies try to explain this paradox focusing on several constraints to environmental action posed by diverse issues. One of these issues refers to institutional factors such as the lack of provision of necessary infrastructure, for example public transportation or recycling management (Kollmuss and Agyeman 2002). Other constraints are related to day-to-day responsibilities such as caring for the well-being of the family (Myers and Macnaghten 1998). In relation to this, it is adduced that people find it more difficult to hold proenvironmental behaviors when they are not aligned with their personal priorities or responsibilities (Kollmus and Agyeman 2002). This would be the case of, for instance, reducing emissions by having a smaller car even if they can afford to have a bigger one. In addition, financial means are also usually mentioned as a constraint to proenvironmental behavior, given that eco-friendly products are normally more expensive than others (Kennedy et al. 2009).

However, in spite of the studies implemented, no definite answers have been agreed upon for the causes of this paradox, which suggests the need for further research.

3. Data, variables and hypothesis.

This study builds on data from a survey conducted in Granada, a town in the South of Spain, in the region of Andalusia. The survey from which our data is drawn was funded by the Spanish Government and implemented by Almanara Social Consulting in 2012 of 5,483 households, from which a representative sample of 1,472 households was obtained. There was one respondent per household. Respondents had to be over eighteen years old and when the household was formed by a family, the head of the household or their spouse was

interviewed. The questionnaire gathered information on socioeconomic variables, environmental variables and SWB variables.

In order to assess SWB, individuals were asked: "How satisfied are you with your life as a whole? The answers were ranked on a scale from 0 to 4 , where 0 corresponds to "very dissatisfied" and 4 to "very satisfied", 2 being "normal".

In order to quantify environmental awareness, we incorporated the variable *concern,* which is based on the following question: "How concerned are you about environment?" to which individuals had to reply (1) Really concerned (2) A little or (3) Not at all. With this information, we created a dummy variable that equals 1 if the individual responded as being really concerned, and 0 in any other case. With respect to this variable, previous literature suggests that concern about environmental issues with negative connotations such as air pollution or noise levels lowers SWB while concern about positive environmental features like biodiversity increases it (Ferrer-i-Carbonell and Gowdy 2007, Rehdanz and Maddison 2008). As we mentioned before, it has been proved that people's psychological well-being is positively affected by the interaction with the environment (Moore 1982, Wilson 1984, Ulrich 1984). Therefore, given that our question refers to an issue with positive implications, we may find that it exerts a positive influence on people's well-being.

As for the variables related to action, we include three subgroups of dummy variables reflecting different environmental responsible behaviors:

- *Water saving habits:* This group is comprised of three variables reflecting actions carried out by the individuals in their daily lives in order to save water:
  - The variable *appliances* takes the value 1 if the individual indicates that they wait until the washing machine and dishwasher are full before starting them, and 0 otherwise.
  - The variable *tap* shows whether the person usually turns off the tap as he/she brushes his/her teeth..
  - The variable *shower* indicates whether the interviewee tries to save water by reducing the duration of their shower.

- *Water saving infrastructures*: This group is comprised of two variables that reflect whether the individual has installed some water saving equipment in their house:
  - The variable *cisterndevice* specifies if the person has a double push-bottom cistern in his/her toilet.
  - The variable *tapdevice* indicates whether the respondent has water saving devices installed in the taps of the house.

- The variable *volunteering* indicates whether the individual has collaborated with any environmental non-profit organization or done any voluntary work related to the environment during the two previous years.

As previously mentioned, to our knowledge there are no previous studies which consider environmentally responsible behaviors related to water, so we cannot predict which influence these variables will exert on SWB. As for *volunteering*, previous research (Eigner 2001, Sohr 2001) suggests we may find that it positively influences SWB.

Moreover, in an attempt to shed more light on the knowledge-concern-action paradox, two additional dummy variables are included:

- *Concernvolunteer*: This variable reflects that the individual is aware of environmental degradation and, at the same time, has collaborated in an organization related to the environment during the previous two years. It is the interaction of *concern* and *volunteering*, and takes the value 1 if the individual fulfills both conditions, and 0 otherwise.
- *Concernnovolunteer:* This variable takes the value 1 if the individual refers to being aware of environmental degradation, but he/she has not collaborated in an organization related to environment during the previous two years, and 0 otherwise.

The last variable refers to the case in which individuals fall in the knowledge-concern-action paradox. In our sample, the percentage of people who report showing concern but not devoting any of their time to the preservation of the environment amounts to 69.41%, against only 12.13% of people who are concerned and report as volunteering (table 1 includes descriptive statistics). The paradox seems to hold in our data, at least in terms of devoting

time to environmental conservation. By including these two variables we aim, therefore, to elucidate the effect of this paradox on SWB by studying if the impact on it is different for the people who fall in the paradox, as opposed for the ones who do not. The reason why we center the study of the effect of the paradox in terms of devoting time to volunteering is that this is the action that demands most time and effort among the ones included in our study. Some studies point out the fact the higher the cost of a proenvironmental behavior, the lower the correlation between awareness and behavior (Diekmann and Preisendoerfer 1992). In using volunteering, we take this fact into account.

In addition to the variables directly related to our objective, we also include variables related to socioeconomic issues, such as *unemployed, age, income and gender*, to control for the effects of these variables on SWB and therefore avoid spurious correlations. We expect the variable *unemployed*, which indicates whether the person is unemployed or not, to exert a negative effect on SWB (Di Tella, MacCulloch and Oswald 1999, Oswald 1997, Clark and Oswald 1994, Selezneva 2011). As for income, in the field work respondents were asked about the monthly income of each member of the household, with the answers being in a range of five categories, the top category being 3500€ and above. To obtain the variable *income*, firstly, the mean point of the interval was chosen for each catagory, with the exception of the top category, for which a value of 4,000€ was chosen. Secondly, we obtained an average household income by adding up the income of every member in the household, and dividing it by the number of people. We expect a positive but relatively small influence from this variable on SWB (Frey and Stutzer 2002b, Diener and Biswas Diener 2002, Fuentes and Rojas 2001, Layard 2005). The variable *gender* takes the value 1 if the interviewee is a woman, and 0 if a man. We cannot be sure of the direction and the influence that this variable exerts on SWB. Some studies in the United States, United Kingdom, and several other European nations using large data sets show evidence that women report slightly higher levels of happiness (Frey and Stutzer 2002b, Blanchflower and Oswald 2004, Oswald 1997). However, some other recent studies suggest that men´s SWB can be higher in some circumstances such as in old age (Plagnol and Easterlin 2008, Easterlin 2003). We also include *age*, which is supposed to affect SWB in a U-shaped manner: Young and old people are usually happier than middle-age people (Blanchflower and Oswald 2004, Frey and Stutzer 2002b, Helliwell 2003, Clark and Oswald 2007). We expect to find this in our analysis. For this purpose, we also include the variable age^2.

4. Results and discussion.

We interpret the SWB of individuals as caused by the above described variables, as represented by the following equation:

$$SWB_i = \alpha + \beta X_i + \gamma EV_i + \varepsilon_i \quad (1)$$

where "i" refers to the i-th individual responding the survey. SWB_i is the answer to SWB question, α is the intercept term, X_i is a vector with the socioeconomic characteristics of the individual and EV_i is another vector including the values of the environmental variables. β represents the vector of the parameters for the socioeconomic variables, while γ contains the estimated parameters related to environmental variables. The error term ε_i captures the measurement errors and unobserved characteristics of the individuals.

Given the nature of the data, it is appropriate to estimate the model using a discrete choice model. In this study, we use ordered logit estimations, performed with the software Stata. After the treatment of the missing values with "listwise method", our sample comprises of 812 cases.

The results of the estimations are presented in Table 2. In order to check for the robustness of the estimated relationships, we construct seven different models containing different groups of variables. All the models are globally significant according to the chi-Square test, based on log-likelihood ratios. We should highlight that pseudo-R^2 are quite low for all models. It should be noted that regressions on SWB normally yield lower pseudo-R^2 than other economic fields (Graham 2010), which means that a large part of the variation of the variable remains unexplained in the models. This is normally attributed to the fact that some of the components that can play an important role in SWB such as emotions and personality traits, are very difficult to control.

The socieoconomic variables are included in all models as controls. As expected, *unemployment* is significant and exerts a negative influence in SWB. The variable *gender* shows here a significant negative relationship with SWB. This means that women are reported to have a higher probability of being less happy than men in our sample. This is shown in table 3 that includes marginal probabilities for the seventh model, which is the one that includes the greatest number of variables. In addition, *income* has a positive coefficient and is found to be significant. However, we find that the variables related to age are not significant

in our model. As we can see, control variables present the same sign and significance for all the estimated models.

The results indicate that there is no significant influence on SWB from any of the three variables related to water saving habits. Behaviors normally entail the individual bearing some costs (not only monetary, but also time or psychological costs) whilst, at the same time, they yield benefits. If the individual follows a cost-benefit logic when assessing the impact of their environmental behavior (Hartmann and Apaolaza-Ibáñez 2008), then it could be argued that the effect of these behaviors on SWB would depend on the net impact of those costs and benefits. In the case of water saving, renouncing a long shower or waiting until one has enough clothes to fill up the washing machine entail sacrifices in daily life. However, as individuals do not see a direct repercussion of their actions on the environment, they are not able to associate their consumption and behaviors to large-scale problems like natural resource depletion or global warming (European Commission 2012;). As a consequence, the feeling of well-being from acting in an environmentally responsible way or from acting in an altruistic way may be too small as to compensate for the sacrifice they must undergo. Some evidence of it can be found in Widegren (1998), Bratt (1999), Andreoni (1990), Hartmann and Apaolaza-Ibáñez (2008) and Nunes and Schokkaert (2003). Therefore, our results may be explained because those actions may be related to acquired habits, so the perceived benefit is insufficient to exert a positive influence on SWB, as if the individuals had adapted to those.

With respect to the variables related to water saving infrastructures, we find a significant positive influence on SWB. Following the same reasoning as before, although the intrinsic satisfaction of behaving in an environmentally responsible way may not be very high, this type of behavior does not demand any sacrifice on behalf of the individual, apart from the low initial economic cost of installing water saving devices in taps and cisterns. It may even be the case that the house had them already installed, then no explicit payment has been made by the interviewee. Those variables can therefore be influencing satisfaction by reflecting the joy of caring on the environment with no cost. It could be also the case that, as water devices are visible and durable, but acts are ephemeral, the former are significant but not the latter. Those interpretations however require further empirical evidenceIt could also be argued that there may be an interaction between this group of variables and income, given that people with higher levels of income may more easily afford the installation of these kinds of devices. Nevertheless, we can observe that the sign and significance of the estimation for *income*

remains the same as in the rest of the models, ruling out the possibility of an interaction between the variables.

The estimated models also indicate that environmental concern shows a significant and positive coefficient, and the marginal probabilities indicate that people who show concern have a greater probability of being satisfied. Given that our variable concern is related to an issue with positive implications, these results are in accordance with our above mentioned premise based on the literature review, which states that concern about environmental issues with negative implications such as air pollution or noise levels has a negative influence on SWB, while concern about positive environmental features like biodiversity increases it (Ferrer-i-Carbonell and Gowdy 2007, Rehdanz and Maddison 2008). Moreover, it has been proven in other research that individuals who are more conscious of environmental problems, are also normally more mindful and tend to be more oriented by intrinsic values rather than extrinsic (Burch 2000, Rosenberg 2004, Princen 1997), both qualities that have proved to be associated with a higher SWB (De Young 1996, 2000, Brown and Kasser 2005). Our variable indicating concern might incorporate some of the intrinsic features of the people surveyed, which could also explain the positive association with SWB.

Concerning *volunteering*, a significant positive relationship with SWB is also found. The estimated relationship is consistent with our expectations based on previous literature (Eigner 2001, Sohr 2001, Meier and Stutzer 2008). As mentioned before, people's psychological well-being improves by interacting with the environment (biophilia), and as people care for the environment, the joy of helping can increase their utility. Other extrinsic rewards from volunteering can also improve SWB, such as developing skills which are valuable for the labor market or meeting other people (Meier and Stutzer 2008).

In the last estimated models we incorporate the variables related to awareness and volunteering or not (*concernvolunter* and *concernnovolunteer* respectively). Both are found to be significant and positively related to the categories indicating being very satisfied. The marginal probability for *concernvolunteer* is however greater than for *concernnovolunteer*. In fact, in the influence of the dissatisfied category, marginal probabilities indicate that the one for *concernvolunteer* is less acute. This indicates that the individuals not falling in the knowledge-concern-action paradox do better in SWB terms than those who fall in it. People who volunteer usually take a great interest and care a lot about environment. Therefore, if we interpret the interaction of concern and volunteer (*concernvolunteer*) as an indicator of

intrinsic enjoyment of volunteering, then we arrive at similar conclusions as Meier and Stutzer (2008): people who put more emphasis on intrinsic goals benefit more from volunteering than those who are more extrinsically oriented. This variable can also be interpreted in the context of the knowledge-concern-action paradox. Among the people who report being concerned with the environment, 85.12% do not perform any environmental voluntary work, and are less satisfied than those who are concerned but volunteer. One plausible interpretation that can be argued in the context of SWB comes from the work of Kahneman, Wakker and Sarin (1997), which distinguishes between experienced utility and decision utility. Experienced utility refers to the hedonic satisfaction obtained after an act of choice, while decision utility is the expectation that individuals have of the experienced utility. The two utilities can mismatch, so it may be the case that individuals that care for the environment but do not volunteer, might be undervaluing the extra satisfaction that they could obtain if they devoted more time to volunteering. This is a new issue in the literature, as it introduces another dimension to this paradox, the satisfaction with life.

5. Conclusion

One of the issues that Ecological Economics has taken a great interest in for some time is exploring precisely how to shift the economy into sustainability. Recently, some authors have pointed out policies focusing on social welfare rather than income or consumption as a way to trigger this conversion (Gowdy 2004, Gowdy 2005), suggesting that SWB research may be the appropriate path to follow in order to design such policies. In this study, we intend to contribute to this research area by further examining the relationship between SWB and some environmental features, namely concern about the environment and actions undertaken by individuals, both inside and outside of the household.

In our results, we find that there is a clear positive link between environmental awareness and SWB. This is of vital importance for policy making, given that one of the crucial elements in order to successfully implement public policies is the involvement and support from civil society. According to Ferrer-i-Carbonell and Gowdy (2007), this involvement highly depends on how aware individuals are of the problem that environmental degradation poses and how relevant this awareness is for their well-being. In our sample we find that there is a high level of awareness among the population (almost 82% of the respondents refer to being concerned), and that it has a highly significant impact on people's SWB. These results can, therefore,

encourage policy-makers to develop policies that tackle these issues, not only for the benefit that they could bring to the environment, but also for the people´s SWB.

We also explore the effects of proenvironmental behaviors on SWB. With respect to it, we find that actions such as habits related to water saving inside the household are not significant in explaining SWB, but using devices or infrastructures that save water increases it. We also find that voluntary work actions to preserve the environment are relevant for SWB, and that the influence on SWB is greater when a person is both concerned and volunteers at the same time.

Environmentally responsible behaviors are sometimes contemplated in terms of self-sacrifice and, therefore, perceived as negative for well-being, which makes people less prone to act in a proenvironmental way. This fact may make policy-makers reluctant to develop environmental policies that involve a change in people's lifestyle (Lenzen and Cummins, 2011), such as targeting consumerism or fixing environmental taxes. However, our study shows that environmentally responsible behavior has either a positive influence on SWB or no significant influence, but in none of the cases does it exert a negative influence. This way we prove, in line with other research (Brown and Kasser 2005, De Young 1996, 2000), that this alleged trade-off between happiness and proenvironmental behavior does not hold.

These results have policy implications: gaining understanding on the drivers of proenvironmental behaviors, and which variables mediate the translation between awareness and action, may be key in order to implement policies that demand behavioral change (Clark, Kotchen, and Moore 2003). Given that it has been extensively proved that environmental awareness itself is not enough to promote environmentally responsible behavior, policy-makers should design campaigns that foster, not only awareness about environmental degradation, but also awareness or consciousness on the important role that individual actions play in preventing this degradation. Emphasis should be made on the fact that a growing consciousness among the population and consistent individual actions (such as environmentally responsible consumption) will eventually provoke a change in the production-waste model and the involvement of other economic agents.

To our knowledge, no previous attempt has been made to simultaneously study the influence of both environmental awareness and behaviors on SWB. Our results contribute to the SWB literature by showing that both awareness and actions are relevant for people's SWB and by putting it into the perspective of the knowledge-concern-action paradox. However, research in

this area is still scarce and some aspects of this relationship such as the strength and direction of the influence, and which variables mediate it, are still to be explored, remaining as open questions for future research.

Acknowledgements

Financial support from the Spanish Ministry of Economics and Competitiveness (Project ECO2009-08824/ECON and Project ECO2012-32189) and the Government of Andalucia (Project P11-SEJ-7039) is acknowledged.

6. References

Albrecht, G., G. Sartore, L. Connor, N. Higginbotham, S. Freeman, B. Kelly, H. Stain, A. Tonna and G. Pollard (2007). Solastalgia: The Distress Caused by Environmental Change, *Australasian Psychiatry*. 15(1): 95-98.

Alesina, A., R. Di Tella and R. MacCulloch (2004). Inequality and Happiness: Are Europeans and Americans different?, *Journal of Public Economics*. 88(9-10): 2009-2042.

Andreoni, J. (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving, *Economic Journal*. 100(401): 464–477.

Blake, J. (1999). Overcoming the 'Value-Action Gap' in Environmental Policy: Tensions between National Policy and Local Experience, *Local Environment: The International Journal of Justice and Sustainability*. 4 (3): 257–278.

Blanchflower, A. and A. Oswald (2004). Well-being Over Time in Britain and the USA, *Journal of Public Economics*. 88(7-8): 1359-87.

Bratt, C. (1999). The impact of norms and assumed consequences on recycling behavior, *Environment and Behavior*. 31: 630–656

Brown, K.W. and T. Kasser (2005). Are Psychological and Ecological Well-being Compatible? The Role of Values, Mindfulness and Lifestyle, *Social Indicators Research*. 74: 349-368. DOI: 10.1007/s11205-004-8207-8

Burch, M. A. (2000). *Stepping Lightly: Simplicity for People and the Planet*, New Society, Gabriola Island, British Columbia. New Society Publishers.

Carroll, N., P. Frijters and M.A. Shields (2009). Quantifying the Costs of Drought: New Evidence from Life Satisfaction Data, *Journal of Population Economics* 22(2): 445-461.

Clark, A.E. and A.J. Oswald (1994). Unhappiness and Unemployment, *Economic Journal*. 104(424): 648–659.

Clark, A.E. and A.J. Oswald (2007). *The Curved Relationship Between Subjective WellBeing and Age.* Unpublished paper. University of Warwick.

Clark, C., S.A. Stansfeld and B. Candy (2006). A Systematic Review on the Effect of the Physical Environment on Mental Health, *Epidemiology*. 17(6): 527.

Clark, C.F., M.J. Kotchen and M.R. Moore (2003). Internal and External Influences on Pro-environmental Behavior: Participation in a Green Electricity Program, *Journal of Environmental Psychology*. 23: 237–246.

De Young, R. (1996). Some Psychological Aspects of Reduced Consumption Behavior: The Role of Intrinsic Satisfaction and Competence Motivation, *Environment and Behavior*. 28: 358-409.

De Young, R. (2000). Expanding and Evaluating Motives for Environmentally Responsible Behavior, *Journal of Social Issues.* 56(3): 509-526.

Diekmann, A. and P. Preisendoerfer (1992). Persoenliches Umweltverhalten: Die Diskrepanz zwischen Anspruch und Wirklichkeit, *Koelner Zeitschrift fuer Soziologie und Sozialpsychologie*. 44: 226–251.

Diener, E., E.M. Suh, R.E. Lucas and H.L. Smith (1999). Subjective Well-being: Three Decades of Progress, *Psychological Bulletin.* 125: 276–302.

Diener, E and R. Biswas-Diener (2002). Will Money Increase Subjective Well-being? A Literature Review and Guide to Needed Research, *Social Indicators Research*. 85(4): 809-827.

DiTella, R., J. R. MacCulloch and A.J. Oswald (1999). The Macroeconomics of Happiness, *ZEI working paper*, No. B 03-1999.

DiTella, R., J. R. MacCulloch and A.J. Oswald (2001). Preferences Over Inflation and Unemployment: Evidence from Surveys of Happiness, *American Economic Review*. 91(1): 335-341.

Di Tella, R. and J.R. MacCulloch (2008). Gross National Happiness as An Answer to The Easterlin Paradox?, *Journal of Development Economics.* 86(1): 22-42.

Easterlin, R. A. (1974). Does Economic Growth Improve the Human Lot? Some Empirical Evidence, in: David, R., Reder, M. (Eds.), *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*. Academic Press, New York: 89-125.

Easterlin, R.A. (2003). Happiness of Women and Men in Later Life: Nature, Determinants, and Prospects, in M. Joseph Sirgy, Don Rahtz, and A. Coskin Samli (eds.), *Advances in Quality-of-Life Theory and Research*. Social Indicators Research 20. 13-25.

Eigner, S. (2001). The Relationship Between ‘‘Protecting the Environment’’ As a Dominant Life Goal and Subjective Well-being, in P. Schmuck and K. M. Sheldon, *Life Goals and Well-Being: Towards a Positive Psychology of Human Striving.* Hogrefe and Huber, Seattle, WA: 182–201.

European Commission (2012). *Science for Environment Policy. Future Brief: Green Behavior. This Future Brief.* Science Communication Unit, University of the West of England (UWE), Bristol.

Evans, G.W. (2003). The Built Environment and Mental Health, *Journal of Urban Health: Bulletin of the New York Academy of Medicine.* 80(4): 536-555.

Ferreira, S., and M. Moro (2009). On the Use of Subjective Well-Being Data for Environmental Valuation, *Stirling Economics Discussion Paper*. 24. University of Stirling.

Ferrer-i-Carbonell, A. and J.M. Gowdy (2007). Environmental Degradation and Happiness, *Ecological Economics.* 60: 509-516.

Frey, B.S. and A. Stutzer (2000). Happiness, Economy and Institutions, *Economic Journal.* 110(466): 918–938.

Frey B.S. and A. Stutzer (2002a). What Can Economists Learn from Happiness Research?, *Journal of Economic Literature.* XL: 402-435.

Frey, B.S. and A. Stutzer (2002b). The Economics of Happiness, *World Economics.* 3(1): 11-17.

Frijters, P. and B.M.S.Van Praag (1998). The Effects of Climate on Welfare and Well-Being in Russia, *Climatic Change.* 39(1): 61-81.

Fuentes, N. and M. Rojas (2001). Economic Theory and Subjective Well-being: Mexico, *Social Indicators Research.* 553(3): 289-314.

Gowdy, J. (2004). The Revolution in Welfare Economics and Its Implications for Environemntal Valuation, *Land Economics*. 80(2): 239-257.

Gowdy, J., (2005). Toward a New Welfare Foundation for Sustainability, *Ecological Economics.* 53: 211-222.

Graham, C. (2010). The Economics of Happiness, *World Economics.* 6(3): 41-55.

Groot, W. (2000). Adaptation and Scale of Reference Bias in Self-Assessments of Quality of Life, *Journal of Health Economics*. 19: 403–420.

Hartmann, P. and V. Apaolaza-Ibáñez (2008). Consumption: The Moderating Role of Environmental Attitudes Virtual Nature Experiences as Emotional Benefits in Green Product, *Environment and Behavior*. 40(6): 818-842. DOI: 10.1177/0013916507309870

Helliwell, J. F. (2003). How's Life? Combining Individual and National Variables to Explain Subjective Well-being, *Economic Modelling*. 20(2): 331-360. DOI:10.1016/s0264-9993(02)00057-3

Israel, D. and A. Levinson (2003). *Examining the Relationship between Household Satisfaction and Pollution.* Mimeo, Indiana State University.

Kalyuzhnova, Y., and Kambhampati, U. (2008). The determinants of individual happiness in Kazakhstan, *Economic Systems.* 32 () 285–299

Kahneman, D., Wakker, P.P., Sarin, R. (1997). Back to Bentham? Explorations of experienced utility, *Quarterly Journal of Economics.* 112: 375–405.

Karp, D.G. (1996). Values and Their Effect on Pro-Environmental Behavior, *Environment and Behavior*. 28(1): 111-133. DOI: 10.1177/0013916596281006

Kasser, T. and R.M. Ryan, R.M. (1996). Further Examining the American Dream: Differential Correlates of Intrinsic and Extrinsic Goals, *Personality and Social Psychology Bulletin*. 22(3): 280–287.

Kasser, T. and K.M. Sheldon (2002). What Makes for a Merry Christmas?, *Journal of Happiness Studies*. 3(4): 313–329

Kempton, W. (1993). Will Public Environmental Concern Lead to Action On Global Warming?, *Annual Review of Energy and the Environment.* 18: 217-245. DOI: 10.1146/annurev.eg.18.110193.001245

Kennedy, E.H., T.M. Beckley, B.L. McFarlane and S. Nadeau (2009). Why We Don't "Walk The Talk": Understanding The Environmental Values/Behavior Gap in Canada, *Human Ecology Review.* 16(2): 151-160.

Kollmuss, A. and J. Agyeman (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior?, *Environmental Education Research.* 8(3): 239-260.

Layard, R. (2005). *Happiness: Lessons from a New Science*. Penguin Books, London.

Lenzen, M., and R.A. Cummins (2011). Lifestyles and Well-Being Versus The Environment, *Journal of Industrial Ecology*. 15(5): 650–652. DOI: 10.1111/j.1530-9290.2011.00397.x

Luechinger, S. and P.A. Raschky (2009). Valuing Flood Disasters Using The Life Satisfaction Approach, *Journal of Public Economics.* 93(3-4): 620-633.

MacKerron, G. and S. Mourato (2009). Life Satisfaction and Air Quality in London, *Ecological Economics*. 68(5): 1441-1453.

Meier, S. and A. Stutzer (2008). Is Volunteering Rewarding in Itself?, *Economica*. 75: 39–59.

Moore, E. O. (1982). A Prison Environment's Effect on Health Care Service Demands, *Journal of Environmental Systems.* 11(1): 17–34.

Myers, G., and Macnaghten, P. (1998). Rhetorics of Environmental Sustainability: Commonplaces and Places, *Environment and Planning.* 30(2): 333 – 353.

Nunes, P. A. L. D., and E. Schokkaert (2003). Identifying the Warm Glow Effect in Contingent Valuation, *Journal of Environmental Economics and Management*. 45: 231-245. DOI:10.1016/S0095-0696(02)00051-7

Ornetzeder, M., E.G. Hertwich, K. Hubacek, K. Korytarova and W.Haas (2008). The Environmental Effect of Car-Free Housing: A Case in Vienna, *Ecological Economics*. 65(3): 516-530.

Oswald, A.J. (1997). Happiness and Economic Performance, *Economic Journal*. 107(445): 1815-1831.

Plagnol, A. and R.A. Easterlin (2008). Aspirations, Attainments, and Satisfaction: Life Cycle Differences Between American Women and Men, *Journal of Happines Studies.* 9(4): 601-619. DOI: 10.1007/s10902-008-9106-5

Poortinga, W. L. Steg and C. Vlek (2004). Values, Environmental Concern, and Environmental Behavior, *Environment and Behavior*. 36(1): 70-93. DOI: 10.1177/0013916503251466

Princen, T. (1997). Toward a Theory of Restraint, *Population and Environment*. 18: 233–254.

Rehdanz, K., and D.J. Maddison (2005). Climate and Happiness, *Ecological Economics*. 52(1): 111-125.

Rehdanz, K. and D.J. Maddison (2008). Local Environmental Quality and Life Satisfaction in Germany, *Ecological Economics.* 64(4):787-797.

Rosenberg, E. L. (2004). Mindfulness and Consumerism, in: Kasser, T. and A.D. Kanner (eds.), Psychology and Consumer Culture: The Struggle for a Good life in a Materialistic World, *American Psychological Association*. Washington DC:107–125.

Selezneva, E. (2011). Surveying Transitional Experience and Subjective Well-being: Income, Work, Family, *Economic Systems*. 35(2):139-157

Sheldon, K. M., and H. McGregor (2000). Extrinsic Value Orientation and "The Tragedy of The Commons", *Journal of Personality*. 68(2): 383–411.

Sohr, S. (2001). Eco-activism and Well-being: Between Flow and Burnout, in P. Schmuck and K. M. Sheldon, *Life Goals and Well-Being: Towards a Positive Psychology of Human Striving.* Hogrefe and Huber, Seattle, WA: 202–215.

Steg, L. and C. Vlek (2009). Encouraging Pro-environmental Behaviour: An Integrative Review and Research Agenda, *Journal of Environmental Psychology*. 29:309-317.

Stern, P. C., T. Dietz and L. Kalof (1993). Value Orientations, Gender, and Environmental Concern, *Environment and Behavior*. 25: 322-348.

Stern, P. C. (2000). Toward a Coherent Theory of Environmentally Significant Behavior, *Journal of Social Issues*. 56(3): 407–424.

Ulrich, R., 1984. View Through a Window May Influence Recovery from Surgery, *Science*. 224 (4647): 420-421.

Van Praag, B.M.S, P. Frijters and A. Ferrer-i-Carbonell (2003). The Anatomy of Subjective Well-being, *Journal of Economic Behavior and Organization.* 51: 29-49. DOI: 10.1016/0304-4076(91)90090-Z

Veenhoven, R. (1991). Questions on Happiness: Classical Topics, Modern Answers, Blind Spots, in Strack, F., M. Argyle and N. Schwarz, *Subjective Well-being. An interdisciplinary Perspective.* Pergamon Press: London: 7-26.

Veenhoven, R. (1996). Developments in Satisfaction Research, *Social Indicators Research*. 37: 1-46.

Veenhoven, R. (2002). Why Social Policy Needs Subjective Indicators, *Social Indicators Research*. 58(1-3): 33-46.

Vringer, K., T. Aalbers and K. Blok (2007). Household Energy Requirement and Value Patterns, *Energy Policy.* 35: 553-566.

Welsch, H. (2002). Preferences Over Prosperity and Pollution: Environment Valuation Vased on Happiness Surveys, *Kyklos.* 55(4): 473-494.

Welsch, H. (2006). Environment and Happiness: Valuation of Air Pollution Using Life Satisfaction Data, *Ecological Economics*. 58(4):801-813.

Welsch, H. (2007). Environmental Welfare Analysis: A Life Satisfaction Approach, *Ecological Economics*. 62:544–551.

Widegren, O. (1998). The New Environmental Paradigm and Personal Norms, *Environment and Behavior*. 30(1): 75–100.

Wilson, E.O. (1984). *Biophilia*. Harvard University Press, Cambridge, MA.

Table 1: Descriptive statistics.

Variable	Mean/%	Std. Dev.
Subjective-welbeing(%)		
Very dissatisfied	0.35	
Dissatisfied	2.90	
Neither satisfied nor dissatisfied	24.82	
Satisfied	49.93	
Very satisfied	21.99	
Age	52.43	(20.2831)
Age^2	3160.197	(2100.274)
Gender (%)	56.82	
Income	6.25	(1.4532)
Unemployed (%)	6.87	
Concern	0.8165007	
Appliances (%)	0.922545	
Tap (%)	0.9218077	
Shower (%)	0.8676269	
Cisterndevice (%)	0.5171233	
Tapdevice (%)	0.0785376	
Volunteering (%)	0.1249118	
Concernvolunteer (%)	0.1213209	
Concernnovolunteer (%)	0.6941852	

Standard deviation of quantitative variables in parentheses

Table 2: The influence of key variables on SWB.

	Sociecon		Usages		Infraest		Concern		Volunt		Paradox		All	
age	-0.0056		-0.0091		-0.0144		-0.0051		-0.0079		-0.0076		-0.0163	
	(0.7925)		(0.6714)		(0.5074)		(0.8115)		(0.7129)		(0.7243)		(0.4586)	
age^2	0.0001		0.0001		0.0002		0.0001		0.0001		0.0001		0.0002	
	(0.7022)		(0.5655)		(0.4102)		(0.6001)		(0.6845)		(0.9012)		(0.3424)	
gender	-0.4344	***	-0.4241	***	-0.3972	***	-0.4008	***	-0.4180	***	-0.3463	***	-0.3630	***
	(0.0016)		(0.0021)		(0.0040)		(0.0036)		(0.0024)		(0.0091)		(0.0089)	
income	0.0004	***	0.0004	***	0.0004	***	0.0004	***	0.0004	***	0.0004	***	0.0004	***
	(0.0018)		(0.0020)		(0.0025)		(0.0011)		(0.0019)		(0.0005)		(0.0018)	
unemployed	-0.7781	***	-0.7951	***	-0.7844	***	-0.7404	***	-0.7723	***	-0.7670	***	-0.7530	***
	(0.0031)		(0.0026)		(0.0029)		(0.0051)		(0.0033)		(0.0037)		(0.0045)	
appliances			0.3518											
			(0.2041)											
tap			-0.1865											
			(0.4767)											
shower			0.1895											
			(0.3749)											
cisterndevice					0.2425	*							0.2555	*
					(0.0825)								(0.0680)	
tapdevice					0.5975	**							0.4717	**
					(0.0080)								(0.0393)	
concern							0.8478	***						
							(0.0000)							
volunteering									0.3611	*				
									(0.0843)					
concernvolunteer											1.0494	***	0.9413	***
											(0.0000)		(0.0003)	
concernnovolunteer											0.8456	***	0.7896	***
											(0.0000)		(0.0000)	
N	812		812		812		812		812		812			
chi2	39.52311		42.428181		50.558236		63.44059		42.50885		74.369127		72.51	
Pseudo- R squared	0.0212		0.0228		0.0272		0.0341		0.0229		0.0345		0.0390	

*** Means that the variable is significant at 1%, while ** means it is significant at 5% and * it is at 10%. All models are globally significant at 1 per cent.

Table 3: Marginal probabilities for subjective well-being (last model).

	very dissatisfied	dissatisfied	normal satisfied	satisfied	very satisfied
Age					
Age2					
Gender		0.0100	0.0581	-0.0119	-0.0573
Income		0.0000	-0.0001	0.0000	0.0001
Unemployed		0.0286	0.1325	-0.0689	-0.0954
Cisterndevice		-0.0073	-0.0416		0.0392
Tapdevice		-0.0111	-0.0702		0.0819
Concernvolunteer	-0.0021	-0.0193	-0.1279		0.1780
Concernnovolunteer		-0.0261	-0.1336	0.0515	0.1112

Marginal probabilities for each outcome, computed at the mean of the quantitative variables. The fields in blank indicate that the marginal probability for that outcome was not significant at 10%.