Analysis

Linking individuals' ecological footprint to their subjective well-being☆

E. Verhofstadt [a,*], L. Van Ootegem [a,b], B. Defloor [a], B. Bleys [c]

[a] *SHERPPA, Ghent University, Belgium*
[b] *HIVA – University of Louvain, Belgium*
[c] *Department of General Economics, Ghent University, Belgium*

A B S T R A C T

Sustainable development poses a major challenge to Western societies as many of their citizens have lifestyles with resource use beyond the earth's carrying capacity. Sustainability transitions will be easier to implement if they also increase individuals' well-being. We investigate the relation between the ecological footprint and the subjective well-being at the individual level, using a questionnaire carried out in Flanders (Belgium). Our results suggest that a lower footprint does not reduce well-being in the sense that we find no significant correlation. In a next step, we investigate the direct impacts of the different ecological footprint components on subjective well-being. Switching to a more environmentally friendly diet and not using electricity for domestic heating create win–win situations as these actions decrease the ecological footprint while increasing reported levels of well-being. Finally, we investigate the socio-demographic determinants of the ecological footprint and subjective well-being to look for indirect impacts. Having a relationship and being a house owner increase subjective well-being and decrease the ecological footprint. Better social life and health and living in a pleasant environment increase subjective well-being with no cost in terms of ecological footprint.

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1. Introduction

There is widespread attention and an urgent need for a more sustainable development and for sustainability transitions, especially in Western countries. The lifestyles of citizens in these countries have significant ecological consequences in terms of resource and energy use. WWF (2014), for instance, reveals that global society needs 1.5 earths to meet its current demands on nature as measured by the ecological footprint. The Ecological footprint per capita of high-income countries is about five times higher than that of low-income countries. As a result, researchers (e.g. Gardner and Stern, 2002) often argue that a series of behavioural changes is needed across different policy fields, such as mobility, food and consumption, production processes, etc. Policymakers are aware of these challenges and are taking sustainability issues into account at various levels: at the global level (e.g. the Post 2015 agenda), at the European level (e.g. sustainable growth as a key goal in the Europe 2020 strategy) and at the local level (e.g. the movement towards sustainable cities or regions).

Stiglitz et al. (2009) relate sustainability issues to the concept of subjective well-being by stressing the challenge of maintaining current levels of well-being for future generations. Many of the necessary behavioural changes have an impact on the way people live and on their well-being, which might impede their acceptance by citizens. Policies that promote

some of these changes will be easier to implement if they are at the same time beneficial for individuals' well-being. This joins in with the call of Helliwell et al. (2013, p. 108) that *"the analytical community needs to help us understand which policies would raise well-being in a sustainable way"*. We want to contribute to this call by integrating information about the environmental impact of individuals and their reported subjective well-being. Therefore we will also examine and compare if people's demographic characteristics are related to their well-being and their environmental impact.

In recent decades, the literature on subjective well-being (SWB) is booming and self-reported data on happiness or life satisfaction is becoming increasingly available. Many studies summarize the main factors influencing subjective well-being, amongst others Blanchflower and Oswald, 2004; Dolan et al., 2008; Stiglitz et al., 2009; Helliwell et al., 2012; O'Donnell et al., 2014. Key factors include age, income, education, work, family life, social capital, religion, community and governance, mental health and physical health. Furthermore, the importance of personality traits, adaptation and expectations are indisputable (e.g. Veenhoven, 1991; Diener, 2000; Helliwell et al., 2012).

We aim to compare information on subjective well-being to information on the environmental sustainability of an individual's lifestyle. A frequently used measure for the (un)sustainability of individual behaviour is the ecological footprint (EF) – the amount of acres of biologically productive land that are needed for the individual's consumption and activities. The largest part of the EF is the area of productive land that is required to absorb an individual's CO_2 emissions – i.e. his carbon footprint (CF). In the literature considerable attention is devoted to the CF and its main determinants. Kerkhof et al. (2009) report diverging results

for the relation between household income and CO_2 emissions: there is a negative relation between income and emissions in the Netherlands and the UK, whereas emissions increase with income in Sweden and Norway. Büchs and Schnepf (2013) show that besides income, also household size and composition is highly relevant for carbon emissions. Larger households have higher emissions in general, e.g. due to heating and laundry, but lower emissions per capita. The authors also find higher emissions for elderly or unemployed people (who spend more time at home), for the higher educated and for those living in rural areas (Büchs and Schnepf, 2013). Also Menz and Kühling (2011) point to the important role of age. Druckman and Jackson (2009) focus on the increased recreation, leisure and household activities (such as commuting, eating, heating, …) as important drivers of the increase in CO_2-emissions.

The relationship between sustainability and well-being is not commonly explored in the literature. When there is a link to the environment or to sustainability in the subjective well-being literature, the focus is often on the impact of the state of the environment. Temperature is highly significant (positive), both for happiness (Rehdanz and Maddison, 2005) and for life satisfaction (Maddison and Rehdanz, 2011). Many studies confirm the negative impact of air pollution on life satisfaction (Welsch, 2006; Rehdanz and Maddison, 2008; MacKerron and Mourato, 2009; Ferreira et al., 2013; Li et al., 2014). Finally, natural disasters such as floods also have a significant negative impact on life satisfaction (Luechinger and Raschky, 2009). Besides looking at the state of the environment, some subjective well-being studies also look at the impact of an individual's attitudes towards the environment on his or her reported subjective well-being. Ferrer-I-Carbonell and Gowdy (2007), for instance, find a negative relation between the concern for ozone pollution and life satisfaction and a positive relation for concern about species extinction. In studies on the ecological or carbon footprint of individuals the focus lies exclusively on household characteristics and behaviour (see Druckman and Jackson, 2009; Kerkhof et al., 2009; Büchs and Schnepf, 2013), so that a direct link to subjective well-being is absent in that literature.

To our knowledge there are three studies that, to some extent, combine information on the EF and subjective well-being. Welsch and Kühling (2011) show that, for a German sample, environmentally friendly consumption[1] raises the reported life satisfaction of individuals. Their measure of environmentally friendly behaviour contains some elements related to the EF, but it is not a comprehensive measure of the environmental impact individuals have through their behaviour. Next, Ericson et al. (2014) indicate that empathy, compassion and non-materialistic values contribute to both subjective well-being and to a more sustainable way of life. Finally, Lenzen and Cummins (2013) integrate two surveys from different samples of the Australian population — the Australian Unity Wellbeing Survey and the Australian Household Expenditure Survey — and identify common determinants for subjective well-being (SWB) and for the carbon footprint. Their aim was to separately extract trends from both surveys on the basis of a common set of determinants. Lenzen and Cummins (2013) find a set of variables that are beneficial for well-being, but have an adverse influence for the footprint: income, car ownership/car use, education/qualifications and recreation and leisure. They also find that the more educated report to be more environmentally concerned, yet this does not result into acting more pro-environmentally.

Lenzen and Cummins (2013) indicate that, at present, there exist no data that combine information on individuals' subjective well-being and their ecological footprint.[2] Our study aims to address this issue, as we have collected that information for one and the same population. As a result we can investigate whether there is a direct link between (a) SWB and (b) the EF and its components. Moreover, in line with the approach of Lenzen and Cummins (2013), we want to investigate if there is an indirect link: which socio-demographic determinants have an impact on both the individuals' SWB and their EF? We aim to identify common determinants with a positive effect on subjective well-being and a negative effect on the footprint. Our objective is also to formulate policy advice based on these results.

In the next section, we provide an overview of our research questions and hypotheses. Section three presents the concepts, the survey and the data while section four contains the empirical results. In section five, we conclude.

2. Research Question and Hypotheses

We first explore the direct link between an individual's ecological footprint and his or her subjective well-being. Afterwards we link SWB to the components of the footprint: food intake, energy use (heating and electricity), paper use, car use, use of public transportation and travel behaviour. Finally, we investigate the indirect link between SWB and the EF in the sense that we identify a number of common determinants for both concepts (see Lenzen and Cummins (2013)). If such determinants influence the EF and SWB in opposite directions, they can create win–win situations in the sense that they can positively influence SWB while at the same time reducing the EF. When win–win variables have policy relevance, we can formulate policy advice about the possibility of creating double dividends. Other variables or policies could create a lose–lose situation. In both these cases, be it win–win or lose–lose, policy implications are evident. We also expect to find variables that influence both the EF and SWB in the same direction. They are beneficial for one outcome but have an adverse effect on the other and thus entail a trade-off for the policymaker. This might be the case for many of the variables from the carbon footprint literature (e.g. income and car ownership). Finally, we will also have win-neutral (or lose-neutral) variables: determinants that have a positive (or negative) and significant impact on only one of both outcomes.[3]

Based on the SWB and EF/CF literature we have formulated a number of research hypotheses that can be found in Table 1. In the table we only include determinants that have been studied in either (a) both research fields or (b) one of the three studies (cfr. supra: Lenzen and Cummins, 2013; Ericson et al., 2014; Welsch and Kühling, 2011) that combine both research fields. In our analyses we will also consider determinants that appear only in the literature of one of the fields (SWB or EF/CF), yet we do not formulate a priori hypotheses for these variables.

3. Data

Our analysis is based on self-reported information obtained from a survey ($N = 1286$) in Flanders (the northern Dutch speaking part of Belgium) in 2013.[4] In the sample, participants are weighted to achieve similarity to the (univariate) frequency distributions in the Flemish population (data from the Labour Force Survey 2012) for life situation, gender and age.[5] In line with the population, the weighted sample

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[1] Environmentally friendly consumption is measured using five aspects: organic food, low energy light bulbs, low energy household appliances, solar thermal heating systems and green electricity.

[2] At macro level, the New Economics Foundation (nef (2012)) links the Ecological Footprint to well-being in the "happy planet index (HPI)" and Cloutier et al. (2014) assess the happiness impact of sustainable practises in communities or cities. However, these studies do not contain an analysis at individual level, including socio-economic and demographic information.

[3] For the interpretation of the results, only variables that have a statistically significant effect are important. We included the concept 'win- or lose-neutral' for those determinants that are significantly related to only one of the two outcomes. For policy makers these determinants can be considered as 'second best' solutions to stimulate either ecological behaviour or increase well-being.

[4] We call the survey LEVO 2013 which is short for LEvensomstandigheden in Vlaanderen Onderzocht – Dutch for "Inquiry into the life circumstances in Flanders". The LEVO survey has been carried out yearly since 2010 with a focus on subjective well-being measures and their determinants. The 2013 edition included an additional series of questions on the Ecological Footprint.

[5] Chi-Square Goodness of Fit Tests show that the univariate distributions for the weighted sample equal the expected ones (from the Labour Force Survey) for life situation ($p = 0.999$), gender ($p = 0.992$) and age ($p = 0.593$).