



Analysis

Greenhouse gas emissions and subjective well-being: An analysis of Swedish households

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ABSTRACT

In the contemporary discussion on society's transformation towards long-term climate targets, it is often implicitly assumed that behavioral changes, unlike technological changes, would lead to reductions in human well-being. However, this assumption has been questioned by researchers, who instead argue that people may live better lives by consuming less and reduce their environmental impact in the process. In this study we explore the relationship between greenhouse gas emissions and subjective well-being, using a sample of 1000 Swedish respondents.

Our results show that there is no strong link between an individual's emissions and subjective wellbeing. We also analyze the relationship between specific emission-intensive activities and subjective well-being and find that none of the activities examined correlates with subjective well-being. Finally, we explore a hypothesis put forward in the literature, suggesting that a poor work-life balance, long commuting distances, and materialistic values may decrease individuals' subjective well-being and increase greenhouse gas emissions. Our results indicate that materialistic values do correlate with lower levels of well-being and to some extent also with higher greenhouse gas emissions.

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1. Introduction

The European Union has adopted a long-term climate target to limit global warming to two degrees Celsius above pre-industrial levels (European Council, 2005). In order to have at least a likely chance of reaching this target, global carbon dioxide emissions would need to be halved between the base year of 1990 and 2050 and approach zero emissions by the end of the century (Meinshausen et al., 2009; Rogelj et al., 2011). Since reductions in developing countries are likely to take time, it is reasonable to assume that developed countries will need to decrease their greenhouse gas (GHG) emissions even more quickly. Assuming a so-called contraction and convergence model, where global per capita emissions are harmonized by 2050, this would imply Swedish reductions of at least 85 percent by 2050 (Åkerman et al., 2007).

According to official territorial accounting, Sweden reduced its GHG emissions by 20 percent between 1990 and 2012 (SEPA, 2013a), while GDP increased by nearly 60 percent (Statistics Sweden, 2013). Seen from a consumption perspective, however, where emissions from imports are added and emissions from exports are subtracted, GHG emissions have instead increased by 15 percent between 1993 and 2010 (SEPA, 2013b). Specific consumption trends that are not entirely

covered in above accounts show that, since 1990, the consumption of red meat has increased by 54 percent (Swedish Department of Agriculture, 2013), and the number of passengers on international flights increased by 163 percent (Karyd, 2013). These trends in consumption indicate that a successful fulfillment of the two-degree climate target may require change that goes beyond eco-efficiency, by also considering lifestyle and consumption patterns. However, policies that enforce behavioral changes are not very popular among citizens (SOM, 2012), probably because of perceived negative consequences for personal finances, convenience and, ultimately, quality of life.

The relationship between consumption and quality of life is contested. Fueled by findings in happiness research that show a diminishing returns for happiness with increased income (e.g. Easterlin, 2003; Inglehart et al., 2008; Kahneman et al., 2006), some scholars argue that people may live better lives by consuming less, reducing their environmental impact in the process (Zidansek, 2007, see Jackson, 2005 for a review of this discussion). This research often highlights ideas related to the concept of downshifting (a.k.a. "slow living,"), i.e., the shift away from a harried and material lifestyle to a lifestyle that puts more emphasis on leisure time and social relations (Alexander and Ussher, 2012; Markowitz and Bowerman, 2012; Schor, 1998). Contemporary consumption research, however, emphasizes that consumption is important to one's identity, for example for maintaining social relations and expressing love (cf. Miller, 1998). In this view, activities and lifestyles with high GHG emissions may be important to us for many different reasons that do not have to relate to crude consumption.

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The aim of this study is to analyze the relationship between the individual's subjective well-being and GHG emissions. Very few previous studies have explored this issue empirically, and to our knowledge none have done so in a sample with estimates of total GHG emissions (cars, air travel, electricity, heat, food and other consumption). Wilson et al. (2013) studied GHG emissions from residential energy use and road transport in Canada and found that higher emission levels in these domains were not connected to higher levels of SWB. Similar conclusions were drawn by Sekulova and van den Bergh (2013) who found that income reductions, which could possibly be seen as a proxy for emissions reductions, had only temporary effects on SWB. Lenzen and Cummins (2013) studied the role of different living conditions for both total carbon footprint and SWB in Australia, but due to data limitations they had to integrate results from two separate analyses of different survey databases. Other previous research analyzing the relationship between quality of life indicators and GHG emissions has mainly approached this issue by means of comparisons across nations (Abdallah et al., 2009; Mazur, 2011; Zidansek, 2007). Results from these studies suggest a positive but diminishing relationship between the GHG emissions of the population and their subjective well-being (SWB).

This paper addresses three specific research questions:

1. What is the general relationship between an individual's SWB and overall GHG emissions?
2. Do GHG-intensive activities and lifestyle choices (e.g., air-travel, leisure-driving – other than for work or commuting, red meat intensive diet, and large residences) affect an individual's SWB?
3. Are there behaviors or underlying factors that imply double dividends, i.e., that correlate with both low GHG emissions and high SWB?

By employing a survey questionnaire combined with registry-based data sources we estimate total GHG emissions for each individual. Through the survey we also collect information on SWB and other relevant explanatory variables. Section 2 includes a description of the mail survey, the variables used in the analysis, and a brief account of how GHG emissions were measured. The results are presented in Section 3, and in Section 4 we discuss our findings. Section 5 summarizes the main conclusions of our study.

2. Method

This section describes the mail survey and registry data sources used to estimate GHG emissions, SWB, and a set of explanatory variables.

2.1. Survey

The mail survey was sent out in May 2012, to a random sample of 2500 individuals between 20 and 65 years of age, residing in the region Västra Götaland, in southwest Sweden. The population density of the region is 65 residents per km², which is more than twice as high as for Sweden as a whole. Gothenburg, Sweden's second largest city, is the main center, with about one third of the region's 1.5 million residents.

The net response rate amounted to 40.1 percent, after two survey mailings, three postcard reminders, and one telephone reminder. Although this is a relatively high response rate compared to international levels, the fact that less than half of the sample population chose not to participate in the survey required a non-response rate analysis. We compared characteristics of the sample population to averages in the specified cohort in Västra Götaland and in Sweden as a whole (obtained from Statistics Sweden, 2013) and found these differences: Women were more likely to answer the survey (55 percent of the respondents); individuals with higher incomes were also overrepresented in the sample; the mean income was 6 percent higher than the average in Västra Götaland and 4 percent higher than the national average. We also found an age bias as our respondents were on average four

years older than the average citizen. Finally, there is a bias towards higher education in the survey sample, as 60 percent of the respondents have post-secondary education, compared to 39 percent of the general population in both Västra Götaland and Sweden as a whole. In most cases, these differences are small and illustrate that our sample is representative for the total population of Västra Götaland as well as Sweden as a whole. The exception is with respect to education, and this may be problematic since higher education could entail differences in other relevant factors as well.

We also controlled for the risk of a self-selection bias given the focus on environmental issues in the survey. The questionnaire included a question on environmental concern, identical to a question included in a broader survey conducted in the same year (SOM, 2012). Luckily, our respondents did not diverge from the general survey on this question.

2.1.1. The Questionnaire

The respondents were asked to answer a total of 47 questions covering different aspects of their everyday lives, including 12 questions meant to retrieve information necessary for the estimation of each individual's GHG emissions (as a complement to registry-based data) and 15 general questions on background characteristics. The questionnaire also included questions on time-use patterns, questions aimed at identifying pro-environmental norms/attitudes/behaviors, and so on. In order to evaluate the questions and scales used in the main survey, a small pilot survey was conducted in 2011, with answers from 87 respondents.

2.2. Measuring Greenhouse Gas Emissions

The method used to estimate household GHG emissions is summarized in Table 1 below. We include the three most important anthropogenic greenhouse gases: carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), expressed as carbon dioxide equivalents (CO₂e) based on their respective global warming potential (GWP) over 100 years. Emissions from residential energy use, private transport, and other non-food consumption are attributed to the household as a whole and divided by the number of adults in each household. Remaining emissions that derive directly from the individual's consumption, i.e., public transport, air-travel, and food consumption, are then added to establish the total GHG emissions of the adult respondents. In all analyses, the GHG emissions are presented per adult.

2.3. Quality of Life Indicators—Subjective Well-being

In this study we have chosen to use subjective well-being (SWB) as an indicator of the respondent's quality of life. However, SWB is just one among several measures designed to capture what we mean by quality of life, including various forms of objective indicators, capabilities, and actualization of human potential. SWB is not the only component of a good life, but it is an important aspect, and it has gained widespread use in both research and applied welfare statistics.

SWB as defined by Diener et al. (1999) is an aggregate measure that combines an affective component (presence of positive or negative mood) and a cognitive component (self-rated life satisfaction). Research has shown that these two components are correlated to some extent (in this study, 0.77**), but it is also possible to be in a positive mood while being simultaneously dissatisfied with one's life and to be satisfied with one's life while being in a negative mood. Hence, the hybrid (aggregated) approach to SWB seems reasonable, as it would be difficult to argue that a person has a high level of well-being while lacking either the affective or cognitive component (Brülde, 2007).

The two-item question used in this study is similar to that used in the World Values Survey (Inglehart et al., 2008). The affective component was measured by asking the respondent how he/she "feels in general" on a seven-point Likert scale, where 1 means "sad" and 7

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