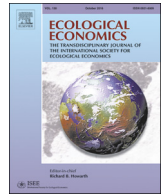




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## Analysis

# Can We Consume Less and Gain More? Environmental Efficiency of Well-being at the Individual Level

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## 1. Introduction

A key question for sustainability science is how to generate higher well-being by, or despite, reducing personal consumption — an outcome known as the “double dividend” (Alfredsson et al., 2018; Jackson, 2005). The idea of the double dividend originated from studies suggesting that, beyond a certain level, increases in GDP or income have little impact on well-being, happiness, or life satisfaction (Costanza et al., 2009; Easterlin et al., 2009; Kahneman and Deaton, 2010; Layard, 2006). Coupled with evidence of environmental degradation associated with economic growth and consumption (Steffen et al., 2007), these studies led scholars to explore how to increase well-being in a more environmentally responsible way.

There are two broad perspectives on the relationship between consumption and well-being. Whereas the conventional economic perspective suggests that individual well-being increases with additional consumption, some psychologists and sociologists have argued that increasing consumption can reduce well-being (Brown and Vergragt, 2016). To understand when low consumption is associated with high well-being, it is important to examine (i) who has high well-being with a relatively small ecological footprint, (ii) what characteristics these individuals possess, and (iii) whether and how local conditions shape the relationship between consumption and well-being.

Several studies have examined which nations have high levels of well-being (hereafter referred to as WB) with relatively small ecological footprints (hereafter referred to as EF) by calculating the environmental efficiency of well-being (EWEB) (Dietz et al., 2009; Knight and Rosa, 2011). However, to our knowledge, no studies have calculated EWEB at the individual level. While national-level studies have identified patterns across cultural and political contexts, they provide limited insight for policy makers interested in sustainable community development. We respond to a call to explore the factors that maximize EWEB at the individual level by employing a more holistic WB measure (Dietz et al., 2012). Our study is an initial attempt to build on national-level EWEB research with individual and neighborhood-level data from a survey containing a context-specific, multidimensional WB metric and a standard EF measure (<https://www.footprintnetwork.org/>). To examine

whether EWEB is shaped by broader socio-economic structures and features of the built environment (Røpke, 1999; Sanne, 2002), we distributed the survey in two neighborhoods in Columbus, Ohio with different socio-economic and physical characteristics (described below).

## 2. Background and Objectives

Our first objective is to examine whether individuals with lower levels of material and energy consumption (as evidenced by smaller EFs), have higher levels of WB. Competing perspectives on the relationship between WB, consumption, and environmental impacts have led to different hypotheses about how to foster sustainable consumption. Classical economic theory views individuals as rational utility maximizers and suggests that because individuals consume to satisfy their desires and preferences, consumption will always increase WB, even if only marginally (Mas-Colell et al., 1995, p.). There is evidence that consumption can reduce stress and increase hedonic WB (Babin et al., 1994) and life satisfaction (Headey et al., 2008). Thus, we might expect a positive linear relationship or asymptotic relationship between WB and consumption.

Critics of this perspective suggest that consumerism and over-consumption have negative social and psychological impacts (Nickerson et al., 2003). For instance, materialist values and the desire for higher income may result in lower levels of WB and life satisfaction (Deci and Ryan, 2000; Diener and Seligman, 2004; Kasser, 2017). Social critics also suggest that we are locked into high consumption by the social and economic structures in which we are embedded (Alfredsson et al., 2018; Sanne, 2002) and that consumer society detracts from quality of life because it does not reflect consumer needs and desires (Brown and Vergragt, 2016). Empirical evidence of causal relationships is limited (Rich et al., 2017), but recent correlational studies found either no significant relationship between subjective WB and carbon footprints (Andersson et al., 2014) or a weak, negative relationship (Ambrey and Daniels, 2017). Other studies have found a small, but significant association between involvement in voluntary simplicity movements and higher life satisfaction (Alexander and Ussher, 2012;

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Boujbel and D'Astous, 2012; Rich et al., 2017). Thus, we might expect a negative or inverted U-shaped relationship between consumption and WB and evidence for the double dividend.

In addition to exploring general relationships between WB and EF, it is important to understand *which* individuals have high WB with relatively low EF (i.e. levels of consumption). Such a measure has been labeled the environmental efficiency of well-being (EWEB) (Dietz et al., 2009; Knight and Rosa, 2011), or, conversely the ecological/carbon intensity of well-being (Dietz et al., 2012; Jorgenson and Dietz, 2015; Jorgenson and Givens, 2015). To date, studies have examined which nations have high EWEB and the economic, social, and political conditions that allow these countries to do so (Jorgenson and Dietz, 2015; Knight and Rosa, 2011). However, calculating a nation's EWEB provides limited insight into how local socio-economic dynamics and infrastructure can shape the relationship between individual consumption and well-being. In addition, EWEB research has largely relied on one-dimensional measures of WB such as infant mortality rates (Dietz et al., 2012) or life expectancy (Dietz et al., 2009).

While no previous research has calculated EWEB at the individual level, previous studies have identified several factors that could impact individual-level EWEB by affecting EF, WB, or both. These factors include household income, social capital, relative wealth, and work-life balance.

### 2.1. Income

Income could be positively or negatively associated with EWEB. Individuals with higher income may have better access to services or infrastructure that contributes to WB, and the capacity to buy more efficient, but expensive, technologies that reduce EF. Conversely, if income is associated with materialistic values (Kasser and Ryan, 1993) or is devoted to goods or services that have large environmental impacts, but provide only short-term boosts in happiness, we would find a negative relationship between income and EWEB. There could be also be threshold effects such that, beyond a certain level, additional income is associated with lower EWEB.

At the individual level, one study found that while income is associated with higher WB, it is also associated with a larger EF (Lenzen and Cummins, 2013). At the national-level, previous studies have produced conflicting results. Two studies found quadratic relationships suggesting that EWEB is highest in countries with moderate GDP (Knight and Rosa, 2011) or that the ecological intensity of WB is lowest in such countries (Dietz et al., 2012). Other studies found no relationship between GDP and the ecological intensity of WB in developing countries but a negative relationship in developed countries (Jorgenson and Dietz, 2015) and that the carbon intensity of well-being was high, yet stable, in OECD countries, but has steadily increased in non-OECD countries (Jorgenson and Givens, 2015). With conflicting results from previous research, different disciplinary theories, and the absence of studies at the individual level, we lack a clear hypothesis about the relationship between income and EWEB.

### 2.2. Relative Wealth

Relative wealth can have a greater impact on subjective WB than absolute wealth (Clark et al., 2008; Easterlin, 1995), so the perception that one is less wealthy than one's neighbors could be negatively associated with WB. The relationship between relative wealth and EF is more complex. Lower perceived relative wealth may fuel conspicuous consumption that increases social status (Charles et al., 2009), but that may, in some conditions, reduce well-being (Linssen et al., 2011). Conversely, if the perception of higher relative wealth is accurate, and if consumption generally increases with wealth, we would expect higher perceived relative wealth to be associated with larger EFs. In fact, (Karlsson et al., 2004) find that households that consider themselves to be in a better relative economic situation have higher levels of

consumption. Because relative wealth may have counteracting effects on WB and EF, its effect on EWEB is unclear.

### 2.3. Social Capital

Social relationships, trust, and a sense of community are components of social capital and important for subjective WB (Brown and Vergragt, 2016; Helliwell and Putnam, 2004). Social capital may help reduce consumption if individuals draw on their social networks to carpool or engage in other forms of collaborative consumption (Brown and Vergragt, 2016). For instance, community gardening and walking children to school may be facilitated by, and enhance social capital and contribute to lower EFs (Helliwell, 2014; Jackson, 2005). Furthermore, while social capital might allow friends to pool resources in ways that increase consumption (e.g. group-level vacation deals that increase travel), pooling resources may also allow for purchases of environmentally friendly and/or bulk goods through buying clubs that may lower one's EF. While the relationship between social capital and individual EWEB has not yet been explored, Knight and Rosa (2011) find that countries with higher levels of trust have significantly higher EWEB scores. The strong links between social relationships and WB and the potential positive relationship between social capital and sustainable consumption lead to the hypothesis that social capital will be positively associated with EWEB.

### 2.4. Work-life Balance

The work-spend cycle may contribute to higher EFs and negatively impact WB (Knight et al., 2013). Working long hours can reduce time spent with family, cultivating social relationships, and pursuing activities to meet psychological needs for autonomy, participation, and creation (Brown and Vergragt, 2016; Deci and Ryan, 2000; Layard, 2006). Overwork can also lead to consumption of devices of convenience that are meant to make our lives easier and save time, but do not always have that effect (Kasser, 2009). Conversely, individuals that are happy with their work-life balance may be more willing and able to devote time to fulfilling activities that meet non-materialist needs (Max-Neef, 1991) and to adopt sustainable consumption patterns that are more time consuming but require less income (Wapner and Willoughby, 2015). While some individuals may use additional leisure time to increase consumption, our hypothesis is that work-life balance will be positively associated with EWEB based on the assumption that it is associated with more time for socially and psychologically meaningful activities and less income for consumption of material goods.

## 3. Methods

### 3.1. Survey Measures

We developed a structured survey to examine the relationship between WB and EF and the impact of the aforementioned variables on EWEB. The survey included a context-specific WB metric containing 26 indicators that were weighted based on their perceived importance to Columbus residents, a set of questions to calculate EF, and questions pertaining to our independent variables and demographic characteristics (see *SI Survey* for the full survey).

#### 3.1.1. Operationalizing Well-being

There is no widely agreed upon definition or metric for measuring WB, nor is there a consistent theoretical framework through which it is investigated (Costanza et al., 2009; King et al., 2014). Our conceptualization of WB is rooted in the eudaimonic perspective, which emphasizes meaning and self-realization and was shaped by the Sustainable Livelihoods Approach (SLA) to poverty reduction (Chambers and Conway, 1992; Krantz, 2001), and by extension, the Basic Needs approach (Streeben et al., 1981) and Capabilities approach (Sen, 1985).

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