

Research Articles

Which Way Forward in Measuring the Quality of Life? A Critical Analysis of Sustainability and Well-Being Indicator Sets

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Abstract

The movement to develop indicators that provide a more nuanced view of quality of life (QoL) continues to gain momentum and support in both scientific and policy-making circles. However, measuring QoL still faces a number of challenges. While a range of indicator sets has been developed, it is unclear whether any of them is able to adequately capture the broad range of conditions it encompasses. In addition, it has yet to be determined whether different dimensions of QoL can be meaningfully integrated in one indicator or if separate indicators need to be employed alongside each other for clear and reliable scientific results and policy advice. In this article, we aim to contribute to answering these open questions. To that end, we offer a framework, grounded in the literatures on well-being and sustainable development, for unpacking the QoL concept, and categorize and evaluate different existing indicator sets in terms of their ability to measure this concept of QoL. Moreover, we identify the challenges involved in integrating two very distinct aspects of QoL in one indicator.

How to measure quality of life (QoL)? Over the last half century, many indicators and indicator sets aimed at providing a detailed picture of individual and societal well-being have emerged. In the political realm, the Organisation for Economic Co-operation and Development's (OECD) "Measuring Quality of Life," the European Union's "Beyond GDP," the Stiglitz–Sen–Fitoussi Commission in France, the Enquete Commission "Wohlstand, Wachstum, Lebensqualität" in Germany, and corresponding efforts in other countries or regions have explored indicators that integrate economic, social, political, and environmental aspects. On the scientific side, numerous studies have employed different

research frames to scrutinize the empirical measures that have been put forward and their (potential) impact (e.g., Babicky 2013; Costanza et al. 2014, 2016; Hayden and Wilson 2018). Yet, considerable uncertainty remains regarding the comparative value of different indicator sets and indices proposed, as well as whether any single one can comprehensively and meaningfully capture QoL.

There is widespread agreement on the need for valid and reliable measures of QoL. Scholars interested in the relative performance of nations and in the impact of different policies on the well-being of citizens require an appropriate yardstick to measure their dependent variable. Likewise, policy makers interested in learning from successful developments in other countries need to know what “success” actually means and where it happens. For both purposes, it makes a significant difference whether well-being is measured in purely economic terms or whether different sets of social, environmental, and political criteria are accounted for.

Yet, scholars as well as practitioners still disagree about how to best measure QoL. One core source of disagreement results from the observed trade-off between complexity (or comprehensiveness), on one side, and accessibility and communicability, on the other. Some participants in the debate argue that no single indicator set will be able to capture all relevant aspects of individual and societal QoL (Aistleithner and Hamedinger 2003; Lawn 2013). At the same time, however, policy makers and scientists need measures that can be used effectively in communication and research to provide relevant information to citizens and politicians and thus argue for simplicity and parsimony (Hák et al. 2018).

In this article, we investigate whether the existing realm of indices includes one that satisfies both the comprehensiveness and communicability criteria such that we may put the question of comprehensiveness–communicability trade-offs to rest. To that end, we suggest a new approach for categorizing and comparing existing measures and employ it in an examination of nine leading indices. The organizing principle for QoL that we put forward combines core aspects raised in the literatures and debates on “well-being” and “sustainable development.” Specifically, it draws on economic, social, and political aspects of well-being, on one hand, and environmental quality and intra- and intergenerational equity/planetary boundaries, on the other. We operationalize these five dimensions, in turn, by distinguishing twenty-one relevant individual categories.

We find that only one of the nine indices analyzed covers all of the dimensions of our QoL concept, and we identify important areas of neglect, especially in terms of the sustainability dimensions of QoL as well as with respect to the political and even some crucial economic dimensions of QoL. Moreover, we demonstrate the absence of a systematic relationship between the well-being and sustainable development branches of our concept of QoL and the prevalence of (varying) trade-offs. Thereby, we underline both the need to include the sustainability dimension in assessments of QoL if seeking policy guidance and the futility of calls for one comprehensive index of QoL in the interest of political communication.

Before we continue, a word about terminology choice. *Quality of life*, *well-being*, and *sustainable development* are very broad terms that have been used by scholars and practitioners in multifaceted and sometimes interchangeable ways. Other related terms exist. Depending on the specific meanings attributed by a given speaker, these three terms can cover substantial common ground. Thus we do not suggest to present or to develop the “correct” concepts of QoL, well-being, and sustainable development here. Rather, we use QoL as an overarching concept to identify in a comprehensive and fundamental sense what “a good life” is all about. Similarly, we use well-being and sustainable development as shorthand for relevant literatures and debates on which we draw and, in consequence, as subconcepts allowing us to integrate core foci of these literatures and debates in our conceptualization of QoL.

Literature Review and Conceptual Elaboration

In this section, we provide an overview and synopsis of the manifold literatures on well-being, sustainability, and QoL as they relate to indicator development and deployment. Underlying our engagement with this topic is the idea that what one measures determines what one sees, what gets reported, and what becomes a policy objective or solution. QoL measures provide critical coordinates for our road map toward the future (Astleithner and Hamedinger 2003; Hezri and Dovers 2006), and policy developments are guided by the foci of and components included in these measures. Indicators thus subtly exercise influence by selecting and structuring information and the interpretation of reality (Waas et al. 2014).

For more than half a century, gross domestic product (GDP) has been the favored measure for assessing progress in human development, although it was never created for that purpose and despite the criticism of such (mis)use from the outset (see Abramovitz 1959). Today, there is increasing consensus that GDP is—at best—an imperfect measure of human well-being (Cassiers and Thiry 2014; Kubiszewski et al. 2013; Stiglitz et al. 2010). Its inadequacy lies in its sole focus on market activities and added economic value that leads to the positive accounting of defensive and reparatory expenditures that, in actuality, often derive from, if not promote, conditions that are detrimental to human QoL (e.g., wars, crime, natural disasters, and environmental degradation). At the same time, nonmarket activities that clearly contribute to individual and societal well-being, such as family care or voluntary community work, are excluded, as are informal markets. In addition, using GDP to measure QoL by means of averaging across incomes grossly ignores empirical realities of (mostly increasing) asymmetries in income distribution within countries (Anand and Segal 2008).

To overcome these limitations, numerous efforts to develop alternative measures have emerged since at least the late 1960s. Indeed, the field has been flooded with new concepts and operational definitions that attempt to better

capture critical components of human QoL. This abundance, however, has created a situation of considerable complexity and disarray. Accordingly, scholars highlight the continued need for indicator assessment and comparison (Waas et al. 2014). One might, of course, assume that this problem has been solved with the development of the Sustainable Development Goals (SDGs) and associated efforts to link them to targets and indicators. However, studies show that the absence of a conceptually grounded and well-designed framework for indicator design and the associated divergence in application have meant that results based on arbitrarily selected SDG indicators are often “inconsistent, incomprehensible, or even dubious” (Janoušková et al. 2018).

At the same time, the necessity or added value of different and more comprehensive indices is still not without controversy. Thus one may argue that for most countries, ranking results do not differ dramatically if one looks at GDP or a more encompassing index like the Human Development Index (HDI; Kelley 1991; Sagar and Najam 1998). Yet, sustainable development scholars and, especially, degrowth scholars would tend to highlight the often negative correlation between economic and certain ecological dimensions of human QoL (Sekulova et al. 2017; Simas et al. 2017). Indeed, it can be argued that indicator development needs to pay particular attention to (long-term) ecological dimensions (Hák et al. 2018; Stiglitz et al. 2010). But what does this mean for the ability of any one QoL measure to include these dimensions in a meaningful way?

To make indicator evaluation more tractable, we propose that indicator sets can be categorized and examined in terms of the issues they cover in relation to well-being and sustainable development. In this endeavor, we use QoL as an overarching concept, as pointed out above, and simultaneously assume this concept to encompass much more than can be measured by GDP alone. Specifically, we conceptualize two branches of QoL on the basis of core concerns of the scholarly literatures and political debates on well-being and sustainable development and suggest specific dimensions for each branch (see Figure 1).

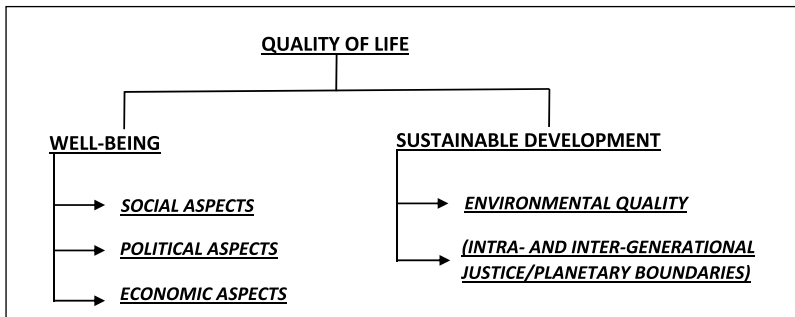


Figure 1
QoL: A Conceptual Basis for Indicator Evaluation

Clearly, and as the subsequent discussion will also show, other conceptualizations of QoL are possible both in terms of the inclusion or exclusion of certain dimensions and with respect to their placement on the branches.¹ Our subsequent evaluation of how extensively different indices capture QoL thus pertains first and foremost to our specific conceptualization, although some broader insights regarding, for example, missing data should also become clear.

Individuals and groups involved in the development of QoL measures have suggested a range of factors that influence an individual's chances of achieving *well-being* (Diener and Suh 1997; Glatzer et al. 2015; Sen 1999). In particular, they have argued that the dynamics and linkages between varied "areas of life" and "objects" (i.e., individuals, collectivities) are highly salient for well-being. Essentially, a focus on well-being situates individual QoL within the community's QoL (Helliwell and Putnam 2004). In consequence, social and political factors, next to economic ones, have to play a role when measuring well-being.

Among the *social conditions*, the debate has long emphasized the role of education and health (or life expectancy) in allowing individuals to create meaningful and productive lives (Anand and Sen 2000; Michalos 2017). In addition, scholars expect social safety nets and the degree of equity within societies to influence individual well-being.² Even in countries that perform strongly in terms of GDP per capita, access to factors that contribute to welfare and human development, such as opportunities for social participation and acceptance, may vary with personal attributes (e.g., wealth, age, gender, ethnicity, or religion). Recent discussions have also turned attention to issues like leisure time and creativity (Brajša-Žganec et al. 2011; Haworth and Lewis 2005).

In terms of *political conditions*, a stable system of rule of law, the protection of fundamental rights and liberties, the potential for participation, and a functioning bureaucracy provide the basis for human security and offer benefits that go far beyond social security or economic success. Also, the ability of citizens to voice their opinions and experience some degree of control over the socioeconomic organization of their societies not only appears to promote inclusive political and economic institutions but also their levels of general happiness (Acemoglu and Robinson 2012; Stadelmann-Steffen and Vatter 2012). An additional category sometimes discussed in the literature in this context is corruption. In our view, however, corruption is a subdimension of the rule of law. Therefore we chose not to include it as a separate category and rely on the following elements to capture the political basis for well-being: civil rights and liberties, the rule of law and general government effectiveness, levels of democratic political participation, and opportunities for direct democratic involvement.

1. Hák et al. (2018), for instance, suggest that in line with the UN Summit 2015 and its adoption of the SDGs, an indicator for each of the five Ps—people, planet, prosperity, peace, and partnership—is needed.
2. Peterson (2014) highlights the need also to take noneconomic inequality into account.

Finally, it is clear that *economic conditions* also influence well-being. Well-being is shaped by income generated from market production (including both formal and informal markets), as well as benefits created by nonmarket productions, such as housekeeping and child-rearing or care responsibilities, matter. Nonmarket production includes all activities that are not produced explicitly to generate profit through exchange and have not been monetarized. Basing his calculations on studies involving twenty industrialized countries, Williams (2004, 440) estimates that nonmarket production accounts for an average of 44.7 percent of an individual's total working hours (see also Miranda 2011). This significant investment of energy into nonmarket activities demonstrates how critical they are for human welfare. As such, they must be integrated into estimates of QoL. In addition, unemployment rates may be considered here.

Admittedly, the distinction between social and economic conditions becomes difficult when considering nonmarket production and unemployment rates. In a similar manner, it is difficult to decide whether civic engagement activities belong to social or political conditions. Such difficulties of distinction indicate that social, political, and economic conditions overlap in everyday life, and this implies that it is a matter of choice where the relevant factors are being listed. What is important, however, is that they are being considered.

Alongside an exploration into political, social, and economic dimensions of well-being, a parallel and contemporaneous effort has been made to bring a concern for environmental resources and degradation to the forefront of indicator development (e.g., Cook et al. 2017; Hák et al. 2012; Wackernagel and Rees 1997). Since the 1970s, the influence of environmental quality on QoL has received increasing attention in science and politics, and scholars have considered the inclusion of measures of environmental quality, such as air and water quality, in well-being indices. Other examples of relevant indicators of environmental quality include soil quality and forest health.

Substantial challenges with respect to the integration of environmental quality in QoL indices exist, of course. A particular concern arises insofar as environmental quality conditions often differ widely across localities. The air quality in Los Angeles will be similar to the air quality in Yellowstone National Park on very few, if any, days per year. Thus one will need to consider methods of aggregating environmental quality conditions without falling into the trap of working with average levels, as has been criticized already in the context of GDP.

With the arrival of the *sustainable development* debate in the late 1980s, moreover, it became clear that the ecological dimension of QoL involves more complex and multifaceted aspects, if individuals and societies are to be able to enjoy a high QoL in the long run (Bieling et al. 2014).³ These aspects relate to the fundamental question of "pursuing human development while maintaining

3. Needless to say, sustainable development as a concept combines economic, social, and ecological perspectives. Since we discussed social and economic conditions under the heading of well-being, however, we will concentrate on the ecological perspective here.

essential ecosystem services and not crossing planetary limits now or later," as embodied in the Brundtland's definition of sustainable development (Hák et al. 2018, 194).

When taking such aspects into account, however, an even more fundamental problem related to the inclusion of the ecological dimension of QoL in relevant indices becomes apparent: the causes and impacts of environmental problems often fall apart not only across space but also across time. Indeed, sustainable development scholars have drawn particular attention to the fact that much of the environmental degradation around the globe throughout history has been driven by consumption in developed countries and more recently by the economic elites and emerging middle classes of countries like China, Brazil, and Mexico. The resulting transnational externalization of environmental costs is also one of the main arguments against claims that countries can simply outgrow their environmental problems.⁴ An individual in a developed country thus may enjoy a high level of environmental quality, but her consumption is linked to environmental degradation in a different locality or at a different geographic scale (O'Brien and Leichenko 2000). Such considerations throw a curve ball at efforts to develop and evaluate sustainability indicators at the level of individual countries.

Similar considerations and resulting ambiguities emerge when turning to other core themes of the sustainable development literature. While the concepts of well-being and sustainable development are clearly interlinked, there are some incongruences between the goals of providing for current QoL needs, which tends to be the purview of well-being scholarship, and guaranteeing future QoL, which is a crucial concern of sustainable development scholarship. After all, the sustainable development concept has served to expand the concept of justice in terms of space and time (Heimbach-Steins 2011). Regarding spatial justice, the notion of intragenerational justice focuses on the relative (in)equality of citizens in global (next to state and local) contexts. Access to economic, social, political, and ecological resources varies even more strongly between countries and societies than within. Extending the concept of justice in temporal terms has meant that notions of intergenerational equity have appeared on the political agenda. They, especially, relate to discussions on planetary boundaries and the recognition that resource (over)use needs to be a focal point of political and scholarly attention if we want to ensure human QoL in the future (Steffen et al. 2015). Thus such considerations also relate to the question whether our analysis and understanding are to offer insights into the potential of a long-term existence of humankind on planet Earth.

Clearly we are not able to resolve these tensions in the context of this article. Instead, we have to make pragmatic choices regarding how to assess the sustainable development branch of QoL. On the basis of the foregoing discussion,

4. This claim has been discussed controversially in the literature on the environmental Kuznets curve.

we choose to assess indicator sets, first, in terms of how they measure the current QoL possible in a society and, second, also in terms of whether they provide results that are reliable in the context of global equity and long-term sustainability challenges. Thus we consider indicator sets in terms of, first, environmental quality in countries and, second, resource distribution across countries and resource consumption by countries. Before the environmental policy debate became the sustainable development debate, measurements of current environmental quality typically were considered under the well-being instead of the sustainable development branch, as pointed out earlier. It seemed more reasonable to us to keep the ecological dimensions together, however. Still, we will explore the implications of a different placement by means of sensitivity analyses in the statistical section of this article.

In sum, our review and synthesis of the literature on indicator development led us to identify five core dimensions (political, social, and economic aspects; environmental quality; and intra- and intergenerational equity/planetary boundaries) to include in our conceptualization of QoL. We are convinced that, at a minimum, these dimensions need to be tracked if we are to truly capture QoL. Still unclear is whether any existing index or indicator set can or already does meaningfully incorporate all of these aspects or if these constituents of our QoL concept are better measured separately. We will explore these questions in the following sections. The preceding discussion has also delineated our decisions regarding a potential operationalization of these dimensions. The resulting ideas are summarized in Table 1.

Analysis

The assessment section consists of three parts. In the first part, we present the indicator sets to be compared. The second part demonstrates the degree to which each indicator set measures the dimensions specified under our conceptualization of QoL. In the third and final part, we test how the two dimensions of QoL conceptualized play out in empirical reality. To do so, we use basic statistical tests within and across indicator sets to compare the index covering all dimensions of our conceptualization—the Sustainable Society Index (SSI)—with GDP per capita.

An Overview of the Indicator Sets

Indicator development has engaged numerous publics and has unfolded at different levels of governance ranging from local community efforts (e.g., Button 2002; Hezri and Dovers 2006) to national and international efforts (Costanza et al. 2014). More localized efforts may offer more granular detail, as they can better tailor indicator development to the particular concerns of the community. On the flip side, international indicator development efforts tend to have greater resources for data collection and management, communication, and dissemination,

Table 1

Categories for Indicator-Based Assessments of QoL

<i>QoL Dimension</i>	<i>Category</i>
Social conditions	Education
	Health/life expectancy
	Social Security provisions
	Equity (within countries)
	Leisure time/creativity
Political conditions	Rule of law and government effectiveness
	Civil rights and liberties
	Political participation
	Direct democracy
Economic conditions	Per capita income
	Nonmarket production
	Unemployment rates
	Size of informal economy
Environmental quality	Air quality
	Water quality
	Access to safe water and sanitation
	Soil quality
Intra- and intergenerational equity/planetary boundaries	Forest health
	Income distribution across countries
	Resource distribution across countries
	Resource consumption (land, carbon, fossil fuels, etc.)

three aspects that increase the efficacy of indicators and also allow for comparative assessments.

This is why, while acknowledging the rich contribution that local and national efforts have made to indicator development, our article focuses on relevant international efforts at developing indicators broadly covering the well-being and/or sustainable development branches of our QoL concept. To be useful in (comparative quantitative) research, furthermore, data need to be available for a sufficient number of countries as well as over a sufficient number of years. Hence we included indicator sets that cover at least thirty countries and are repeatedly updated so as to cover multiple time points.⁵

In the following, we provide an overview of the nine existing indicator sets that meet these criteria. Table 2 shows that the development, compilation, and reporting of indicator sets have been spearheaded by a variegated set of public and private actors (ranging from the World Bank to the Centre for Sustainable Economy). The number of countries⁶ covered ranges from a low of 36 (OECD Better Life Index [BLI]) to a high of 189 (last wave of the HDI). Three indicator sets cover more than two decades (Genuine Savings [GS], HDI, and Inclusive Wealth Index [IWI]). Four collect and publish their data every two or three years (Bertelsmann Transformation Index [BTI], Environmental Performance Index [EPI], Happy Planet Index, SSI), while the remainder report annual data.⁷

Measuring the Quality of Life—A Comparison

To what degree can these nine indicator sets be used to measure QoL as it is conceptualized in this article? To answer this question, we coded each indicator set (see Table 3) in terms of whether it included a given dimension and its categories (each coded as 1 if included and as 0 if not). We provide two summary figures tapping into QoL coverage: the first sums up the number of categories covered by each indicator set (Coverage 1); the second represents the number of dimensions covered by the individual categories (Coverage 2). As our conceptualization consists of five dimensions with a total of twenty-one categories, Coverage 1 can reach a maximum value of 21, while Coverage 2 can take on a maximum value of 5. It bears mentioning that, hypothetically, an indicator set could cover only five individual categories and still encompass all of the five dimensions. Similarly, an indicator set could measure five categories and only

5. Thus we did not consider indicator sets designed to capture one particular dimension or category, such as peace indices, corruption indices, or democracy indices.
6. As resource-rich countries have advantages in collecting, recording, and reporting sustainability data, they tend to be better represented in these indicator sets.
7. Users of each of these indicator sets should have a look at the methodological details, though, given that the composite indices often compile data from different time points. For example, the Happy Planet Index 2016 mostly is based on country data for 2012. In addition, when data are not available for a country, the authors of the HPI employ data imputation “where it has been possible to impute missing data points robustly” (HPI Methods Paper 2016, 3). Unfortunately, information on how the imputation was performed is not provided.

Table 2

Indicator Data Sets

<i>Indicator Set</i>	<i>Type</i>	<i>Institutional Source</i>	<i>Countries Covered (No.)</i>	<i>Years Covered</i>
BTI	Composite index	Bertelsmann Foundation	129	2006, 2008, 2010, 2012, 2014, 2016, 2018 (ongoing)
EPI	Composite index	Yale University	180	2006, 2008, 2010, 2012, 2014, 2016, 2018 (ongoing)
GS (adjusted net savings)	Adjusted national accounts	World Bank	141	1990–2017 (ongoing)
HPI	Composite index	The New Economics Foundation	161	2006, 2009, 2012, 2016 (ongoing)
HDI	Composite index	United Nations Development Programme	189	1990–2017 (ongoing)
IIAG	Composite index	Mo Ibrahim Foundation	54	2008–2017 (ongoing)
IWI	Adjusted national accounts	United Nations, United Nations University International Human Dimensions Programme on Global Environmental Change; United Nations Environment Programme; UNESCO	140	1990–2014 (ongoing)
BLI	Composite index	Organisation for Economic Co-operation and Development	36	2011–2017 (ongoing)
SSI	Composite index	Sustainable Society Foundation	154	2006, 2008, 2010, 2012, 2014, 2016 (ongoing)

Data for countries covered relate to the most recent version of each indicator set (earlier versions may cover fewer countries). Data for years covered relate to the situation in March 2020.

Table 3
Coverage of Nine QoL Indicator Sets

	<i>No. Categories Covered (Coverage 1)</i>	<i>No. Dimensions Covered (Coverage 2)</i>	<i>Dimensions Covered</i>
BTI	8	3	Social, political, and economic conditions
EPI	6	2	Environmental quality; intra- and intergenerational equity/planetary boundaries
GS (adjusted net savings)	4	3	Social conditions; environmental quality; intra- and intergenerational equity/planetary boundaries
HPI	5	3	Social conditions; environmental quality; intra- and intergenerational equity/planetary boundaries
HDI	3	2	Social and economic conditions
IIAG	9	4	Social, political, and economic conditions; environmental quality
IWI	7	4	Social and economic conditions; environmental quality; intra- and intergenerational equity/planetary boundaries
BLI	9	4	Social, political, and economic conditions; environmental quality
SSI	14	5	All

cover one dimension (e.g., social conditions). The former would be more comprehensive in terms of capturing all dimensions of well-being and sustainable development, while the latter would give a more detailed view of one dimension of well-being.

Table 3 offers a simplifying but nevertheless concise overview of the indicator sets' capability of measuring our QoL conceptualization as presented earlier. Among the nine indicator sets, only one covers all of the five dimensions introduced by our concept of QoL: the SSI. The latter also covers the most—that is, fourteen—categories.

Among the others, three indicator sets—the Ibrahim Index of African Governance (IIAG), the IWI, and the BLI—stand out with measuring four of the five dimensions and covering nine (IIAG, BLI) or seven (IWI) categories. The BTI is

an example of an indicator set measuring a comparably high number of categories (eight) that, however, only capture three of our proposed dimensions.

Qualitatively, three findings can also be derived from Table 3. First, the HDI and the BTI are the only indicator sets that do not include any category that could be linked to measuring the ecological aspects linked to the sustainability development branch of our QoL concept.⁸ Despite being used widely, therefore, especially the HDI should only be treated as offering a limited measure of QoL. Second, and in contrast, only the EPI includes no dimension or category that can be linked to the individual well-being branch. Third, only four of the nine indicator sets cover the political dimension of well-being, the one that encompasses all dimensions (the SSI) and the three rather specifically politically interested indicator sets, BLL, BTI, and IIAG, while all the others ignore political aspects. At a time, when some authoritarian systems are more and more interested in improving social and economic as well as environmental conditions, this is at least an interesting finding (for a discussion of environmental authoritarianism, see Beeson 2010; Zhu et al. 2015). It implies that—if successful in improving these conditions—an authoritarian regime like China might score very high in the EPI, the GS, the HPI, the HDI, and the IWI.

When going more into the details of the categories covered, we also identify some interesting patterns. Table 4 lists the (number of) indicator sets covering the different categories. Three insights emerge. First, and perhaps not surprisingly, the lack of attention to direct democracy aspects of well-being is mirrored in the thin coverage of the various categories of political conditions of well-being. Second, few indicator sets cover several categories of ecological sustainability even though a number of them address individual ones. More importantly, perhaps, none of the indicator sets covers intragenerational equity in terms of income or equity in terms of the distribution of resource consumption. Third, also none of the analyzed indicator sets considers nonmarket production or the size of the informal market. This neglect of certain categories of the economic and equity dimensions of our QoL concept partly reflects the methodological nationalism still prevalent in much of the social but also the environmental sciences and the difficulties associated with obtaining this information. It also highlights the continuing shortcomings in QoL assessments via such indicators, however.

Overall, our comparison of indicator sets shows that the SSI performs best in capturing much of our concept of QoL, covering the most dimensions and categories. It thus suggests itself as a good choice of index for relevant quantitative analyses. Even this index, however, does not cover all relevant aspects of

8. Recently, an extended version of the HDI, the Human Sustainable Development Index (HDSI), which includes CO₂ emissions, has been proposed (Togtokh 2011). Although the HDSI has been shown to offer a more detailed view on development (Bravo 2015; Ray 2014), nobody has as yet embarked upon calculating the HDSI for a large set of countries and on a continuous basis. This explains why the HDI is still used much more widely and is also the reason why we have excluded the HDSI from our analysis.

Table 4
Categories (Not) Covered

Category	No. Indicator Sets Covering Category	Indicator Sets
Education	7	BLI/BTI/GS/HDI/IIAG/IWI/SSI
Health/life expectancy	6	BLI/HDI/HPI/IIAG/IWI/SSI
Social security provisions	3	BLI/BTI/IIAG
Equity (within countries)	4	BTI/HPI/IIAG/SSI
<i>Leisure time/creativity</i>	1	<i>BLI</i>
Rule of law/government effectiveness	3	BTI/IIAG/SSI
Civil rights and liberties	3	BTI/IIAG/SSI
Political participation	4	BLI/BTI/IIAG/ SSI
<i>Direct democracy</i>	0	–
Per capita income	5	BLI/BTI/HDI/IWI/SSI
<i>Nonmarket production</i>	0	–
Unemployment rates	5	BLI/BTI /IIAG/IWI/SSI
<i>Size of informal economy</i>	0	–
Air quality	4	BLI/EPI/GS/SSI
Water quality	3	BLI/EPI/SSI
Access to safe water and sanitation	3	EPI/IIAG/SSI
Soil quality	4	EPI/HPI/IWI/SSI
Forest health	5	EPI/GS/HPI/IWI/SSI
<i>Income distribution across countries</i>	0	–
<i>Resource distribution across countries</i>	0	–
Resource consumption (land, carbon, fossil fuels, etc.)	5	EPI/GS/HPI/IWI/SSI

Italics indicate categories not covered.

the QoL. Further methodological developments are needed to allow the inclusion of relevant transnational information in country-level data.

The Sustainable Society Index—Capturing Two Branches of the QoL Concept?

Launched in 2006, the SSI is currently available for 154 countries and is released biannually. This index was developed and is compiled through a private initiative, the Sustainable Society Foundation. The SSI covers three welfare dimensions,

namely, environmental, human, and economic welfare, by subsuming twenty-two indicators that cover different aspects of each dimension (Kaivo-oja et al. 2014; Saisana and Philippas 2014). Compared to the indicator sets evaluated in the previous section, the SSI stands out in that it contains categories of each dimension. Using them, we will explore how our conceptualization of QoL as consisting of a well-being and sustainable development branch plays out in empirical reality. To that end, we first calculate mean values for our two branches—well-being and sustainable development—on the basis of the items used in the SSI. Second, we correlate these mean values with each other to establish the extent to which both branches are distinct. Third, we contrast the SSI-based mean values on well-being and sustainable development for each country with its GDP values. Correlating these values will allow us to assess the differences between measuring QoL with an eye to well-being versus sustainable development. Moreover, it allows us to assess whether they can be meaningfully combined in one index.

For our first step, we calculated a mean value for each branch and country, using the SSI data. To do so, we first ascribed each of the items used in SSI to one of our five dimensions.⁹ We then calculated the mean value of well-being as the mean of the values for the social, political, and economic conditions per country. In the same vein, we calculated the mean value of sustainable development as the mean of the values for the environmental quality and the intra- and intergenerational equity/planetary boundaries per country. At the end of this process, we obtain a single (average) value for each of the two branches for each country. Both variables (theoretically) range between 1 and 10, with 1 denoting a country with a very low mean level and 10 a country with a very high mean level of the respective branch.¹⁰

Importantly, the results reveal no correlation between the sustainable development and well-being branches of QoL (Figure 2). While countries (or their values on both branches) cluster in the center of both scales, there is no systematic relationship between both variables. This lack of an observable correlation between well-being and sustainable development, in turn, suggests a necessity to treat them as distinct concepts in theoretical terms and measure them separately in empirical terms.

The previous analysis already sheds some light on the question of whether a measure of QoL requires more than just a one-item indicator. Figure 2 clearly

9. We included the following SSI items for our dimensions: Social Conditions = Sufficient Food, sufficient to drink, Education, Healthy Life, Gender Equality, Income Distribution, Population Growth. Political Conditions = Good Governance. Economic Conditions = GDP, Employment, Public Debt. Environmental Quality = Safe Sanitation, Biodiversity, Organic Farming. Intra- and Intergenerational Equity/Planetary Boundaries = Consumption, Energy Use, Energy Savings, Greenhouse Gases, Renewable Energy, Renewable Water Resources. We left out Genuine Savings, as the indicator can be ascribed to two of our dimensions, Economic Conditions and Environmental Quality. However, attributing Genuine Savings to either of the two dimensions in alternative specifications does not substantially change the findings presented here.

10. For more details on the SSI methodology, readers are directed to the SSI website at <http://www.ssfindex.com/>, last accessed March 26, 2020.

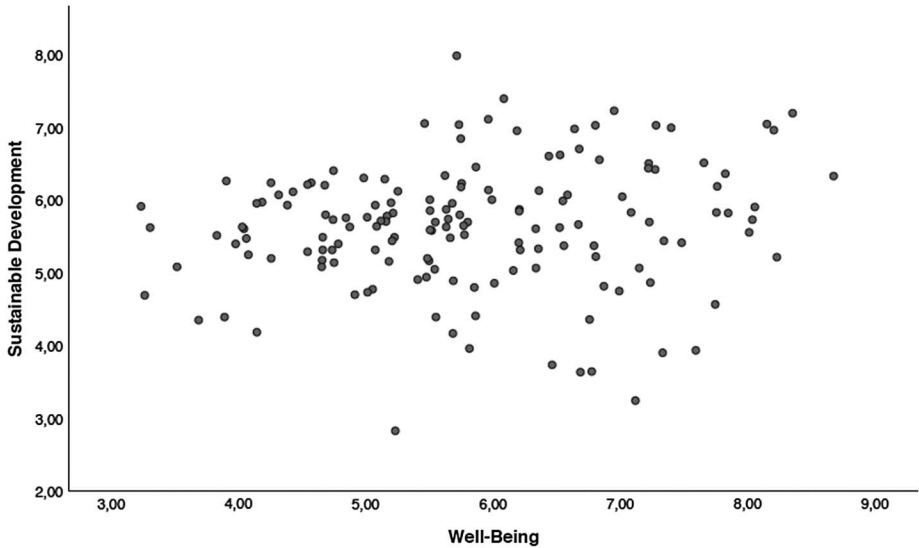


Figure 2

The (Non-)Correlation of Well-Being and Sustainable Development

indicates that there is a need for a multifaceted indicator set, as the two branches of QoL show distinct empirical patterns. Table 5 and Figure 3 provide even stronger evidence in support of this finding. Table 5 presents the ranks of the ten countries that are highest and the ten countries that are lowest on the SSI-based measurement of well-being (column 2). Columns 3, 4, and 5 contain the difference between the rank in well-being and sustainability (column 3), between the rank in well-being and GDP (column 4), and between the rank in sustainability and GDP (column 5) of these countries.

In the first and second columns, we see a familiar picture. The Northern and Western European countries, New Zealand, and Australia, but also Estonia,¹¹ rank highest in terms of individual well-being, while eight countries of sub-Saharan Africa and the war-torn Iraq and Yemen rank lowest. However, note the difference between the ranks of these countries when plotting sustainability against well-being. While New Zealand ranks 3rd on the branch of well-being, it only ranks 113th in sustainable development (a difference of 110!). A similar picture also emerges for Iceland, Australia, Estonia, and Luxembourg, with Norway, Finland, and Sweden following suite. The two countries with only a few differences between their well-being and sustainability rankings are Switzerland and Denmark.¹² An inverse relationship can be observed for the

11. The surprisingly high position of Estonia is due to its impressively low public debt (9.7% of GDP in 2016).

12. Of course, this is because the SSI, too, does not include transnational environmental externalities. Otherwise, these two countries would also be ranked much lower.

Table 5

Rank Ordering of Countries: Well-Being, Sustainable Development, and GDP

	<i>Rank Well-Being</i>	<i>Diff. WB – SD</i>	<i>Diff. WB – GDP</i>	<i>Diff. SD – GDP</i>
Norway	1	-27	-1	26
Switzerland	2	-2	-4	-2
New Zealand	3	-110	-18	92
Sweden	4	-9	-4	5
Denmark	5	-2	-2	0
Luxembourg	6	-50	5	55
Australia	7	-64	-5	59
Iceland	8	-82	4	86
Estonia	9	-55	-28	27
Finland	10	-16	-6	10
Zimbabwe	144	61	20	-41
Angola	145	43	60	17
Gambia	146	115	5	-110
Iraq	147	6	49	43
Chad	148	56	35	-21
Sudan	149	6	31	25
Mauritania	150	29	29	0
Mozambique	151	66	20	-46
Yemen	152	15	16	1
Central African Republic	153	98	1	-97

The list ends with rank 153, despite that there being 154 countries in the SSI. This is because we had to exclude Taiwan, as there is no GDP value available for the country. GDP = gross domestic product. SD = sustainable development. WB = well-being.

countries scoring lowest on well-being: the Central African Republic, rank 153 on well-being, ranks 54th on sustainable development, resulting in a difference of 99 between the well-being and sustainable development rankings. For Gambia, rank 146 on well-being, the difference between its position on well-being and rank 30 on the branch of sustainable development is even larger (116!). With the exception of Iraq and Sudan, the same holds for all other countries—albeit with different margins of difference. The considerably higher ranks of these developing countries with regard to sustainable development is largely due to their poverty, which also implies low levels of resource use. In other words, these countries have a better score when it comes to sustainable development, but this

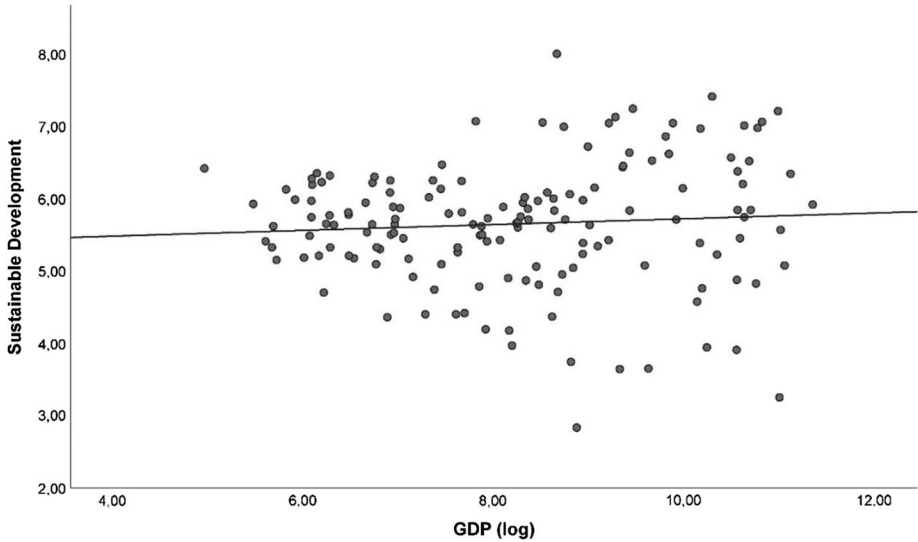


Figure 3
The (Non-)Correlation of GDP and Sustainable Development

comes at the high price of poor performance in societal and economic aspects of well-being.¹³

In sum, these findings provide a more general empirical corroboration of Bravo's (2015) observation that integrating ecological variables, such as CO₂ emissions, into well-being measures (the HDI in Bravo's case) significantly changes the comparative rankings of countries. Figure 3 demonstrates the correlation between (log) GDP and SSI-based sustainable development values. The plotted regression line shows a nearly horizontal line—that is, a nonrelationship between a country's GDP level and its level of sustainable development, as measured by the respective indicators included in the SSI ($R^2 = 0.005$).

Comparing a country's rank in well-being and GDP, in contrast, demonstrates similarities between both concepts. Here correlations are much higher ($R^2 = 0.73$). At first glance, then, measuring GDP as a proxy for QoL might be appropriate when one wants to measure well-being alone (see Figure 4). Even the similarity between WB and GDP is restricted, however, when one has a closer look at the rank differences for, for example, New Zealand, Estonia, Iraq, and several of the sub-Saharan countries scoring lowest in well-being. This suggests that even the use of GDP as a shortcut for well-being might lead to a rough and (in quantitative terms) noisy picture.

13. These findings show the value added of our approach in comparison, for example, to the EPI. In the latter, countries like Somalia always perform very badly because they have no policies in place to protect the environment. However, the actual footprint of a Somali citizen on his country's environment, and even more so when it comes the globe, is almost nonexistent, and the EPI has no way to correct for this.

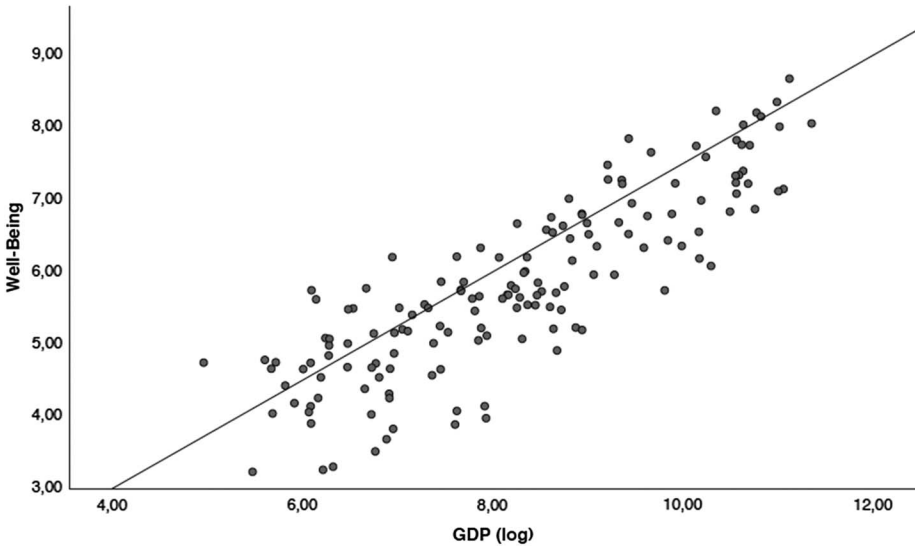


Figure 4
The Correlation of GDP and Well-Being

Most fundamentally, however, GDP clearly is a very bad indicator for sustainable development. The rank differences are similar in magnitude to the differences between sustainable development and well-being. If anything, both concepts correlate negatively—the higher the GDP per capita, the lower the level of sustainable development. This also means that using GDP as a proxy for an encompassing concept of the QoL would be grossly misleading.

Discussion and Conclusions

In this article, we explored questions of indicator development with respect to QoL. As a starting point, we developed a conceptual framework for systematically unpacking QoL to facilitate its measurement. In this framework, we specified two basic branches of QoL: well-being and sustainable development. We suggested five dimensions of QoL for these branches, following core foci in the literatures on well-being and sustainable development. These five dimensions, in turn, were operationalized on the basis of an overall set of twenty-one individual categories. We then used these dimensions and categories to evaluate the ability of nine international indicator sets to fully measure our concept of QoL. In a second step, we used the data from the indicator set that showed the highest coverage in this analysis, the SSI, to explore whether our two conceptualized branches of QoL, well-being and sustainable development, can be meaningfully integrated into one index. Clearly our empirical results are to some extent dependent on the specific concept of QoL we suggest. At the same time, they do

offer some broader insights, which we expect to hold irrespective of individual changes to conceptual details other scholars might want to make.

We found that only one of the nine indicator sets covers all of the dimensions of our QoL concept. In contrast, two indicator sets (HDI, BTI) did not measure any sustainable development dimensions, while another, the EPI, did not measure any well-being dimensions. It is also worth noting that fewer than half of the indicator sets cover the political dimension of well-being, which is arguably an important oversight. Should a country like China succeed in improving the economic, social, and environmental situation of its citizens, it would score highly in several of the indicator sets, thus ignoring the harsh conditions Chinese citizens, particularly if they are of Muslim faith, face when it comes to human rights, political freedoms, and democratic participation.

We also found that important aspects of the economic dimension of well-being often fail to be taken into account. None of the nine indicator sets encompasses information about nonmarket production or the informal in addition to the formal economy. This is likely due to the notoriously difficult nature of gaining reliable data on these aspects of economic well-being. Yet, to the extent that we want to learn something about the economic well-being of nations as a whole, instead of focusing only on the share of economic production that is part of the official labor market and gets registered by the official data-gathering exercises of national statistical offices, the available indicator sets provide little help.

Most importantly, however, our investigation of the well-being and sustainable development data for the SSI failed to identify a systematic relationship between these two branches of QoL. In contrast, our analysis highlights the prevalence of trade-offs between well-being and sustainable development: many countries with high scores on well-being rank much worse when it comes to sustainable development, simply because creating economic wealth is often associated with nonsustainable levels of resource consumption. The flip side is that countries with low scores on well-being often rank much higher in terms of sustainable development, mostly because their poverty is associated with low resource consumption. At the same time, however, the variance in country performance on one versus the other branch is so large that we do not register more than a very weak negative correlation between well-being and sustainable development.

A correlation between high levels of (especially economic) well-being and resource overconsumption will not come as a surprise to many sustainable development scholars, of course. Still, it is interesting to tie this insight into the incongruity of the different branches of QoL directly to questions of indicator development and use. For such questions, the message of our results is twofold: first, yes, GDP or even more comprehensive indicators of well-being fall woefully short of comprehensively capturing QoL and thus cannot be relied on for policy guidance or valid research findings related to QoL; and second, this should not lead to further calls for one comprehensive index, however, since the different branches of QoL show such a range of dynamics among each other

(including negative correlations) that a single numeric result would defy any attempt at meaningful interpretation.

Our findings thus suggest that both scholars and policy makers should present, analyze, and assess country scores both on well-being and on sustainable development in order to get a full picture of how countries fare in terms of fostering QoL. The two branches represent important and yet very distinct aspects of QoL. Indeed, scholars and practitioners need to individually consider both dimensions and investigate those countries that have managed to create high levels of well-being with less unsustainable patterns of resource consumption, in particular.

In fact, the indicator set that turned out to be the most comprehensive in covering QoL as it is conceptualized in this article, the SSI, follows this line of reasoning. Instead of presenting a suggestive ranking of countries along a single index, the SSI keeps separate country scores on three subdimensions: human well-being, economic well-being, and environmental well-being (with the latter covering aspects of what we refer to as sustainable development). In our view, this is a more adequate way of assessing individual countries' QoL performance than lumping everything together and thus disregarding important trade-offs between well-being and sustainable development. Also within sustainable development governance, the focus on trade-offs is receiving more attention. A report from the Intergovernmental Panel on Climate Change (2018, 33), for instance, discusses the potential trade-off between greenhouse gas mitigation and the SDGs.

Finally, our analysis revealed another important blind spot in the available approaches to measuring QoL. Since all the indicator sets focus on the performance of individual countries, they necessarily disregard questions of global dependencies and redistributive effects *between* (groups of) countries. In particular, much of the wealth and well-being in the Global North is directly or indirectly linked to processes of environmental degradation in the Global South (Collier 2010). While several indicator sets partly seek to account for aspects of individual countries' resource (over)consumption, none looks at the distribution of income or natural resources between countries. Given that these aspects do not apply to one country in isolation but are systemic in nature, it seems that the best way of addressing this important topic would be by providing indicators for the distribution and redistribution of resources and income between countries or world regions. Such indicators would be an important complement to the country league tables at the heart of existing indicator sets.

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