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ANALYSIS

Quality of life: An approach integrating opportunities, human needs, and subjective well-being

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ABSTRACT

Enhancing Quality of Life (QOL) has long been an explicit or implicit goal for individuals, communities, nations, and the world. But defining QOL and measuring progress toward meeting this goal have been elusive. Diverse “objective” and “subjective” indicators across a range of disciplines and scales, and recent work on subjective well-being (SWB) surveys and the psychology of happiness have spurred interest. Drawing from multiple disciplines, we present an integrative definition of QOL that combines measures of human needs with subjective well-being or happiness. QOL is proposed as a multi-scale, multi-dimensional concept that contains interacting objective and subjective elements. We relate QOL to the opportunities that are provided to meet human needs in the forms of built, human, social and natural capital (in addition to time) and the policy options that are available to enhance these opportunities. Issues related to defining, measuring, and scaling these concepts are

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Natural capital
Social capital

discussed, and a research agenda is elaborated. Policy implications include strategies for investing in *opportunities* to maximize QOL enhancement at the individual, community, and national scales.

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1. Introduction

The understanding, measurement, and improvement of human experience have been major goals of individuals, researchers, communities and governments. The overall assessment of human experience has been commonly expressed by the term *quality of life* (QOL) across multiple disciplines including psychology, medicine, economics, environmental science, and sociology. A search of the Institute for Scientific Information (ISI) database from 1982 to 2005 reveals over 55,000 citations utilizing the term “quality of life.” QOL as a general term is meant to represent either how well human needs are met or the extent to which individuals or groups perceive satisfaction or dissatisfaction in various life domains. Understanding QOL has tremendous potential implications because improving QOL is a major policy and lifestyle goal (Schuessler and Fisher, 1985). Recent research on QOL has focused on two basic methodologies of measurement. One method utilizes quantifiable social or economic indicators to reflect the extent to which human needs are met. The other looks to self reported levels of happiness, pleasure, fulfillment, and the like, and has been termed “subjective well-being” (SWB — see Diener and Lucas, 1999; Easterlin, 2003).

The so-called “objective” measurements of QOL generally center on social, economic, and health indicators (Cummins et al., 2003), utilizing tools such as the UN’s Human Development Index (HDI) and GDP/capita (Vemuri and Costanza, in press). In the field of medicine, Health Related QOL (HRQOL) research has resulted in the development of numerous individual instruments, each intended to measure HRQOL for specific subsets of populations based, for example, on age, disease status, and condition. While these measurements may provide a snapshot of how well some physical and social needs are met they are narrow, opportunity-biased, and cannot incorporate many issues that contribute to QOL such as identity and psychological security. It is also clear that these so-called “objective” measures are actually proxies for experience identified through “subjective” associations of decision-makers; hence the distinction between objective and subjective indicators is somewhat illusory.

More “subjective” measurement tools typically focus on personal reports of life experience that complement social, economic, and health indicators, such as the degree to which a perceived need is being met and the importance of that ‘perceived need’ to one’s overall QOL. Haas (1999) argues QOL is “primarily a subjective sense of well-being.” In the literature, SWB has often been used as a proxy for QOL (Haas, 1999; Easterlin, 2003). However, in addition to some methodological flaws, subjective assessments of well-being have trouble delineating preference adaptation and the fact that people judge their well-being in comparison with peer groups rather than in absolute terms (e.g., see Schwarz and Strack, 1999).

While both methods have offered insight into the QOL issue, there are a number of limitations to using each of these approaches separately. Further, individual scientific disciplines have emphasized various aspects of QOL that are most pertinent to their respective disciplines, with no single QOL instrument flexible enough to be used across disciplines, cultures, and time. In this paper we address the limitations of current QOL concepts and measurement methodologies by integrating these two basic approaches. We suggest that overall human QOL is a function of *both* the level of human needs met *and* the extent to which individuals or groups are satisfied with this level. By integrating “objective” and “subjective” assessments of QOL it is possible to get a more complete and useful picture of QOL at multiple spatial and temporal scales. Our more comprehensive approach fills the gaps inherent in the other concepts and measurement tools. At the same time our work has pointed to important directions for QOL research, as well as elaborating the policy implications of a more accurate metric of QOL. We start with a definition of QOL that integrates the objective and subjective elements.

2. An integrative definition of quality of life

When we evaluate the state of human affairs or propose policies to improve them, we typically proceed from assumptions about the characteristics of a good life and strategies for achieving them. We might suppose, for example, that access to particular resources is a part of a good life and, therefore, that increasing economic production per-capita is an appropriate goal. Unfortunately, our underlying assumptions are rarely tested and established. We therefore need a more basic approach to defining quality of life (QOL) that, in turn, can guide our efforts to improve humans’ daily life experience. Examinations of QOL often fall under two headings:

1. So-called “objective” indicators of QOL include, for example, indices of economic production, literacy rates, life expectancy, and other data that can be gathered without a subjective evaluation being made by the individual being assessed (although, of course, we must acknowledge that subjective judgments of the researcher are involved in the process of defining and gathering “objective” measures as seen in the case, for example, of selecting a proxy for “literacy”). Objective indicators may be used singly or in combination to form summary indexes, as in the UN’s Human Development Index (HDI-UNDP, 1998). To the extent to which such a measure can be shown to be valid and reliable across assessment contexts (admittedly a difficult task), these relatively objective measures may help us gather standardized data that are less vulnerable to social comparison and local adaptation (e.g., minimizing

the degree to which QOL is largely a function of comparing one’s life to others’ in one’s locale, in the media, or some other narrowly construed group; should we agree that a person’s QOL is high simply because others in the locale are more miserable?).

- Subjective indicators of QOL gain their impetus, in part, from the observation that many objective indicators merely assess the opportunities that individuals have to improve QOL rather than assessing QOL itself. Thus economic production may best be seen as a *means* to a potentially (but not necessarily) improved QOL rather than an end in itself. In addition, unlike most objective measures of QOL, subjective measures typically rely on survey or interview tools to gather respondents’ own assessments of their lived experiences in the form of self-reports of satisfaction, happiness, well-being or some other near-synonym. Rather than presume the importance of various life domains (e.g., life expectancy or material goods), subjective measures can also tap the perceived significance of the domain (or “need”) to the respondent. Diener and Suh (1999) provide convincing evidence that subjective indicators are valid measures of what people perceive to be important to their happiness and well-being. Nevertheless, there are individuals who cannot provide subjective reports or whose subjective reports may not be as trustworthy in reflecting their true welfare because of the internalization of cultural norms, mental illness, lack of information, or other reasons.

What seems best, then, is to attempt an approach to QOL that combines objective and subjective approaches.

Our integrative definition of QOL is as follows:

QOL is the extent to which objective human needs are fulfilled in relation to personal or group perceptions of

subjective well-being (Fig. 1). Human needs are basic needs for subsistence, reproduction, security, affection, etc. (see Table 1 and below). SWB is assessed by individuals’ or groups’ responses to questions about happiness, life satisfaction, utility, or welfare. The relation between specific human needs and perceived satisfaction with each of them can be affected by mental capacity, cultural context, information, education, temperament, and the like, often in quite complex ways. Moreover, the relation between the fulfillment of human needs and overall subjective well-being is affected by the (time-varying) weights individuals, groups, and cultures give to fulfilling each of the human needs relative to the others.

With this definition, the role of policy is to create opportunities for human needs to be met, understanding that there exists a diversity of ways to meet any particular need (Fig. 1). Built, human, social, and natural capital (Costanza et al., 1997) represent one way of categorizing those opportunities. Time is also an independent constraint on the achievement of human needs.

Social norms affect both the weights given to various human needs when aggregating them to overall individual or social assessments of SWB, and also policy decisions about social investments in improving opportunities. Social norms evolve over time due to collective population behavior (Azar, 2004). The evolution of social norms can be affected by conscious shared envisioning of preferred states of the world (Costanza, 2000).

3. Human needs and quality of life

In this section we propose a list of human needs to be used as the basis for generating a set of indicators for both QOL and

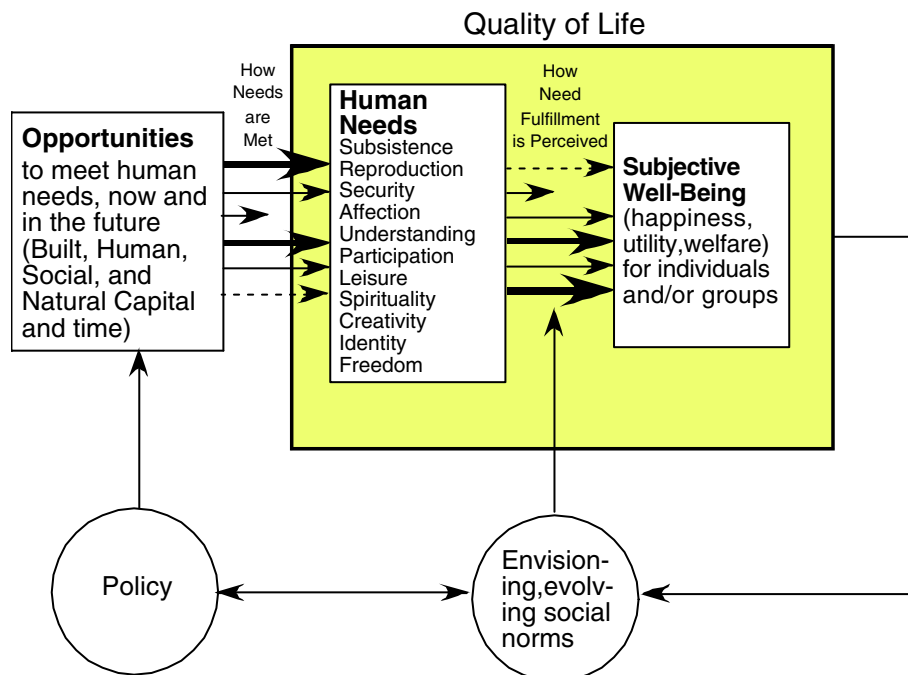


Fig. 1 – Quality of Life (QOL) as the interaction of human needs and the subjective perception of their fulfillment, as mediated by the opportunities available to meet the needs.

Table 1 – List of human needs (*denotes the most important input)

Human needs	Descriptors (direct satisfiers)	Types of inputs needed
Subsistence	Food, shelter, vital ecological services (clean air and water, etc...) healthcare, rest	Built capital* Natural capital* Human capital Time Social capital
Reproduction	Nurturing of children, pregnant women Transmission of the culture Homemaking	Human capital* Time* Social capital Natural capital
Security	Enforced predictable rules of conduct Safety from violence at home and in public Security of subsistence into the future Maintain safe distance from crossing critical ecological thresholds Stewardship of nature to ensure subsistence into the future	Social capital* Built capital Time Natural capital
Affection	Care for the sick and elderly “Being able to have attachments to things and persons outside ourselves; to love those who love and care for us, to grieve at their absence.” (Nussbaum) Solidarity, respect, tolerance, generosity, passion, receptiveness	Time* Social capital
Understanding	Access to information Intuition and rationality	Natural capital Human capital* Natural capital Built capital Time Social capital
Participation	To act meaningfully in the world Contribute to and have some control over political, community, and social life Being heard Meaningful employment Citizenship	Social capital Social capital Human capital Natural capital Time
Leisure	Recreation, relaxation, tranquility, access to nature, travel	Time* Natural capital Built capital Social capital Human capital
Spirituality	Engaging in transcendent experiences Access to nature Participation in a community of faith	Human capital Human capital Social capital Natural capital Time
Creativity/emotional expression	Play, imagination, inventiveness, artistic expression	Human capital* Time* Natural capital
Identity	Status, recognition, sense of belonging, differentiation, sense of place	Social capital*
Freedom	“Being able to live one’s own life and nobody else’s. This means having certain guarantees of non-interference with certain choices that are especially personal and definitive of selfhood, such as choices regarding marriage, childbearing, sexual expression, speech and employment” (Nussbaum) Mobility	Natural capital Social capital* Natural capital

SWB. We decided to use the term “needs” rather than “domains” because we found the needs language to be clearer and more useful. The needs were derived primarily from an integration of Max-Neef’s (1992) “Matrix of Human Needs” and

Nussbaum and Glover’s (1995) “Basic Human Functional Capabilities.” We took the spirit of Nussbaum and Glover, but the practical matrix of Max-Neef. We changed a few of Max-Neef’s “axiological” categories in light of other

conceptions of basic needs and also clarified definitions for each human need. We split off a new category titled “reproduction” from Max-Neef’s subsistence category. This category is based on the concept of “social reproduction” (see Bakker and Gill, 2003). “Subsistence” refers to the current population, while “reproduction” refers to future generations. This is not to suggest that subsistence and reproduction are not integrated at a basic level, but rather to emphasize the importance of the reproduction aspect of subsistence. They are distinct enough needs to warrant separate categories, in our opinion. Moreover, acknowledging the importance of reproduction has significant policy implications particularly regarding women and their role in society. We changed the titles of Max-Neef’s category of “protection” to “security” and “idleness” to “leisure.” These two changes were intended to better communicate the underlying concept rather than to change it. For example, “idleness” has negative connotations in many cultures (even though this connotation may be undeserved if one really understands the underlying concept). We also added a new category of “spirituality” meant to encompass the ways humans feel a sense of transcendence or connection to a larger system or power. This sense of connection may or may not have religious affiliations.

We also consulted other research into basic needs including Frisch’s (1998) “Quality of Life Inventory,” Cummins’ (1993) “The ComQuality of life-A5,” Maslow’s (1954) “Hierarchy of needs,” “Need Hierarchy Measure of Life Satisfaction” of Sirgy et al. (1995) and “Quality of Life Questionnaire” of Greenley et al. (1997). We used this research to check our categories, determine new categories, and to develop our definitions.

It is important to realize that some of the needs we propose are overlapping and some are conflicting. For example, as noted above subsistence is closely related to reproduction. Understanding and creativity may overlap in so far as knowledge may be necessary to enhance creativity and vice-versa. In terms of the contradictory nature of some needs, some people may believe that their quality of life depends upon living in a community where their religious view is enforced for all. If some people believe that their quality of life depends on living in a community where all women are veiled or where no one has access to abortion, others in the community may feel that their quality of life is diminished by these conventions. One person’s recreational need to drive a snowmobile may conflict with others’ subsistence needs for clean air.

It is also important to note that this enterprise is by its very nature normative. There are no completely “objective” measures because QOL is by its very nature a normative, subjective concept. There will inevitably be disagreement between different individuals, but the point of the exercise so far is to identify a minimum set of needs that occur cross-culturally and over time. How these needs are met and the relative weights that various individuals and groups give to meeting one relative to the others will vary, as elaborated in later sections.

It is also important to note that, while QOL is subjective and normative, there may well be more objective, evolutionary reasons behind it. The question of “why do certain things and activities make people feel (subjectively) happy?” is an important one deserving of additional research. For example, are the things and activities that make people happy also the

things and activities that lead to the survival of human populations over time? This is an interesting and important question, but outside the scope of this paper.

Table 1 is our list of human needs, their descriptors, and the inputs (or satisfiers) needed to fulfill each need. This last column highlights the fact that different types of inputs are needed to satisfy different needs. We have included time as an essential input along with built, natural, social and human capital. For example, for any individual there is a limited amount of time that must be distributed among various activities. We are interested in how time can best be distributed in order to maximize quality of life.

4. Opportunities

The ability of humans to satisfy their basic needs come from the opportunities available and constructed from social, built, human and natural capital (and time). Policy and culture help to allocate the four types of capital as a means for providing these opportunities. Here we define:

- social capital as those networks and norms that facilitate cooperative action (Putnam, 1995)
- human capital as the knowledge and information stored in our brains, as well as our labor
- built capital as manufactured goods such as tools, equipment, buildings
- natural capital as the renewable and nonrenewable goods and services provided by ecosystems (Costanza and Daly, 1992).

Table 1 demonstrates the importance of these capitals as inputs to the satisfiers of the various human needs. For example, built capital is a primary satisfier of the need for subsistence (via, for example, shelter), but natural capital is also a primary satisfier of subsistence (via, for example, clean air and water), and human and social capital are also important (via, for example, healthcare). Likewise, the need for participation can be satisfied by involvement in social life (social capital) or meaningful use of one’s talents (human capital).

The inherent nature of the capitals will help to guide policy and decision making in regards to meeting human needs. For example, social capital and information (a component of human capital) improve through use. This is how our social networks and scientific knowledge generally grow. Built capital and the labor element of human capital wear out through use, following the second law of thermodynamics. Some aspects of natural capital improve through use and repair themselves through solar energy capture. Careful understanding of the nature of these capitals will help to most efficiently provide opportunities to meet human needs.

5. Weighting of human needs and subjective well-being

Building on the work of Danna and Griffin (1999), Lewin (1951), Meadow (1988), and others, Sirgy (2002) argues that human

beings structure or organize their cognitive and affective experiences (and their memories of them) by life domains (e.g., work, family, friends, health, etc.). Sirgy (p. 34) notes that these life domains tend to be organized and structured around a focal set of human needs. Thus we argue that the domains can be construed as categories of experience through which we address human needs using built, human, social, and natural capital.

From this orientation, we view QOL as a multidimensional construct emerging from the evaluation of multiple needs on the individual, community, national, and global levels. Of course, it is unlikely that satisfaction of all needs contribute equally to any given individual's or group's QOL. Rather, each need is assumed to contribute in varying degrees to overall QOL. We can refer to the relative contribution of each need to QOL as its "weight" in contributing to overall QOL or, from the perspective of the respondent, its "importance."

From this perspective, overall QOL at any point in time is a function of (a) the degree to which each identified human need is met, which we will call "fulfillment" and (b) the *importance* of the need to the respondent or to the group in terms of its relative contribution to their subjective well-being. In the simplest of strategies, measurement would consist of two distinct scales to assess each item regarding a human need; one of the scales would record the degree of *fulfillment* and the other would record the relative *importance* of the need.

For some purposes (i.e. assessment of the degree of specific need fulfillment across individuals or communities), one may want to use this disaggregated information directly. For other purposes (i.e. assessment of overall quality of life) some form of aggregation will be necessary. A basic aggregation approach, such as summation, may be deemed adequate for some purposes to get a overall assessment of QOL. Alternatively, a more complex aggregation scheme might be used for some purposes. For example, one could assume (or discover through additional research) that the various human needs are so highly interdependent that a non-linear, (i.e. multiplicative) function is a better representation of how they interact to produce overall quality of life. One could also incorporate the finding that people tend to weigh losses more heavily than gains and construct an aggregation scheme that incorporated this directionality.

The subjective *fulfillment* and *importance* of any given need may vary in predictable ways within and across groups of people, and across time and space contexts. That is, the weighting of particular information may vary as a function of principles and relationships that are identifiable. For example, Schwarz and Strack (1999) provide an extensive review of research that illustrates that, among other findings, a domain (or *need* in our language) will have greater impact when it is: (a) associated with more recent experience; (b) is conceptualized as a part of a current phase (rather than former) of one's life; (c) is not categorized as an extraordinary/extreme example of one's experience; (d) is judged in the presence of others with exemplary characteristics in that domain (leading one to use that other individual as a standard for social comparison); and (e) is valued by others whom the individual respects.

It is clear that judgments of QOL necessarily reflect the outcome of a fluid, dynamic system. Not only the evaluation of

any one need, but also the degree (i.e., weight) to which any one need contributes to QOL is fluid and dynamic across time and context. Moreover, the content of the needs themselves are dynamic, given overlap among and interaction between need categories. For example, security needs may change over one's lifetime or in response to a change in state in how other needs are met. Thus, in designing an assessment of QOL, the goal should be to create a tool that will capture the weighting that is being used by a particular person (or group of persons) at a particular time and place.

In order to achieve this, useful population samples are needed to empirically identify and define the weights. A default strategy for doing so is to calculate the mean weight for individual needs or groups of needs within a given population as Frisch (1993, 1994a,b, 1998) did in calculating QOL. This approach will be helpful in guiding public policy decisions regarding individual and group priorities, as it suggests the ways in which various needs are differentially important (on average) for different groups. These groups may be defined by nation, community, age, occupation, or other sub-sample characteristics. Similarly, cluster analyses of weightings, for example, can help to identify whether there are various subgroups of individuals with similar priorities that policy makers may need to address in attempting to promote higher quality of life. For example both young adults who are caring for preschool children and midlife adults who are caring for elderly parents may share particular requirements in order to attain higher QOL.

As discussed above, we can also use the *fulfillment* and *importance* scores to create a single overall metric. The product of how well a need is being met (*fulfillment*) by how important that need is (*importance*) gives us a single measurement representing the degree to which needs of varying priorities are being met. This would provide an indication to individuals, groups and policy makers of where resources might be allocated (acknowledging that other factors, such as competing needs, perspectives, and resources, must also be considered in final allocation decisions). This strategy can also provide an index with which communities could compare QOL levels over time and relative to other communities. By tracking fulfillment and importance scores separately, one can determine whether overall QOL is improving because of changes in how well needs are being met (*fulfillment*) vs. changes in the weights assigned to each need (*importance*).

As noted above, weightings for domains will likely vary in some systematic manner by various characteristics. The most valuable measure of QOL will be constructed in a manner that permits these variations in weightings (by sample characteristics) to be used by respondents, recorded, and analyzed. These variations, themselves, provide information that appears critical for responsive public policy decision-making.

The outcomes of using such a process would permit us to measure and compare QOL within and between groups of people—defined by population characteristics such as age, residential community, ethnicity, etc. This process also allows us to uncover:

1. potential relationships between the fulfillment and the importance of needs

Table 2 – Example indicators for measuring human needs at the individual and national scales

Need	Individual scale	National scale
Subsistence	Self reports on: caloric intake access to clean air, water Access to health care	National data on: caloric deficiencies Aggregated data health care
Reproduction and care	Self reports on: maternity leave/child care Family provision for care Household and child care allocation within the household	National data on: existence and scope of family leave laws Aggregated data on family provision and care Aggregated data on household duties
Security	Self reports on: who provides care in case of acute, chronic illness Who provides care for aged parents etc. Interpersonal violence experiences Environmental practices	National data on: nursing homes, shared housing, multigenerational households Aggregated data on who provides care Crime statistics Aggregated data on environmental practices
Affection	Self reports on: level of attachment to significant others	National data on: aggregated data on levels of attachment, suicide, homicide
Understanding	Self reports on: newspaper, radio, tv, internet usage for news information	Aggregated data on: media usage for news
Participation	Self reports on: volunteering, association memberships	National data on: aggregated data on volunteering, association membership
Leisure	Self reports on: time use, activities pursued, money spent	Aggregated data: time use, activities pursued and money spent
Spirituality	Self reports on: spiritual/transcendent experiences spiritual organization membership	National data on: religious/spiritual book production/sales number and diversity of religious/spiritual organizations Aggregated data on self-described spirituality
Creativity/emotional expression	Time spent on spiritual activities Self reports on: free time use	National data on “elite culture” organizations, events, participation Aggregated data on free time use
Identity	Sense of play in work, etc. Self reports on: major statuses, sense of “place”	Aggregated data on: statuses and sense of “place”
Freedom	Self reports on: personal freedoms in various social contexts (family, work, religion, etc.)	National data on: freedom indicators, expression, press, voting policies etc...

- possible discrepancies between fulfillment and importance grouped by type of capital required to fulfill each need
- variation in weights by population characteristics
- variation in overall QOL (e.g., one community’s needs being met over another’s).

It is important to keep in mind that weightings will fluctuate as a result of intentional as well as unconscious manipulation by individuals through re-evaluation strategies. Re-evaluation may be based on: personal history, self-concept, social comparisons, goal selection, goal implementation and attainment, and through re-appraisal (Sirgy, 2002). One might extend this notion to consider the ways in which commercial organizations, governments, and other groups attempt to engage people in re-evaluation strategies. We elaborate on this in the policy section below.

6. Scale and measurement issues

The analysis of human needs is complicated by the different spatial and temporal scales of analysis at which human needs may be understood. One obvious level, of course, is the individual. In order to gauge QOL on the basis of human needs, measures of individual needs must be obtained. Despite the fact that we are interested in objective measures of human needs (e.g., caloric intake), often the most efficient way to operationally define such needs is through self-report. For some indicators, survey methodology is most appropriate

and generally provides reliable and valid information. For example, surveys can assess the human need for security by understanding who provides care in the case of acute illness. For the security indicator of interpersonal violence, however, personal, telephone, or mail intrusions are not appropriate. Rather, research has shown that an in-depth structured interview by an individual who has established a strong trusting relationship with the interviewee is more likely to produce truthful, valuable responses (e.g., Erlanger, 1974, 1979).

At increasingly complex levels of human groupings beyond the individual, it is possible to use aggregate measures based on self-report data. Such an approach may be the only way to measure difficult abstractions such as “Identity” at the level of the nation-state. Nevertheless, sources that already have aggregated individual-level data or that measure human needs at the aggregate level itself may be available for use. Examples of the former include suicide and homicide rates to measure [lack of] Affection. Examples of the latter includes using national policies supporting maternity and family leaves to measure aspects of Reproduction and Care.

In order to operationalize the measurement of fulfillment of the human needs described in Table 1, we have constructed a working table to show the kinds of empirical indicators that might be used to measure each of the 11 human needs for two units of analysis: the individual and the nation. Table 2 provides a list of indicators at the individual and national scale for measuring human needs. The indicators or measures are meant to be illustrative rather than exhaustive, and the logic

represented in the table is easily extrapolated to analysis at the community or regional level.

The goal is not to choose between the individual measures and the aggregate measures, but to build interpretations of the emerging patterns and relationships to common resources with the understanding that actual communities act differently, not only from one another but also internally with respect to the various needs. Therefore, there is no such thing as a “correct” scale. The “scale of interest” is determined by: (1) the question or problem of interest; and (2) the scale at which we look to find the pattern (e.g. individual, regional, or national level). For example, to identify patterns at the individual level or very small temporal scales, we must focus our attention on larger spatial regions or longer temporal scales so as to find statistical ensembles for which observations become more regular. In moving between scales, we trade off the loss of detail (or heterogeneity within a group) for the gain of predictability (Costanza and Maxwell, 1994).

These QOL measures represent a snapshot in time. It is understood that any measurement data used for predictive purposes would need to be collected over sufficiently long time periods to successfully capture or model the co-evolution of humans with their environment and develop an effective knowledge base. For example, with the increases in migration rates and the creation of more industrialized societies and environmental problems, we believe that the need to record and develop tools for identifying patterns in space and time, storing these patterns, and retrieving these measurements is all the more urgent. Our ability to properly receive and interpret patterns from measurements in combination with policy over rapid time frames will provide the key to improving QOL and to our collective survival.

7. Research agenda

By combining so called *subjective* and *objective* measures into a single QOL concept we get a more realistic picture of the important inputs and variables for improving QOL. Our general tool provides a framework for further research. At the same time, this work has generated a series of specific questions to focus this future research.

One of the major issues with any measurement tool is the scaling issue. In this case, the question of how a QOL indicator deals with multiple spatial (cultural, regional) and temporal scales is vital for the efficacy of the tool. The idea that the importance of specific human needs (relative weights) changes over the lifespan of an individual was recognized by Maslow (1954). Little work, however, has been done to understand how weightings vary as a function of being evaluated by individuals versus groups like communities, regions, and nations. Research along these lines would prove invaluable for creating effective policy, especially where tradeoffs are concerned, such as smoking in public places or snowmobiling in National Forests. This line of inquiry would also get at the question of how measurements of individuals’ QOL can be aggregated to larger groups. The process is not likely to conform to the linear, additive function we typically use for this purpose, and survey data

in this vein could help develop a more accurate nonlinear aggregation model.

It is also important to know how individual and group evaluations and weightings of human needs change over time not just qualitatively, as in Maslow’s framework, but also quantitatively. Using statistical methods with large survey data sets and long-term longitudinal studies, this research can elucidate societal trends and possibly highlight the mechanisms contributing to preference evolution. It is also important to investigate the ways in which individual and group weightings are vulnerable to (mis)information and (mis)perception. For example, it is possible for a dark colored smoke rising from a city smoke stack to be absolutely benign, but still have a negative effect on a community’s QOL due to a *perceived* threat. Weightings must not be a purely mathematical issue, but also incorporate and understand the underlying mechanisms responsible for assigning the weights.

It is possible that as we aggregate QOL indicators up from individuals and small groups to the country scale cross-cultural similarities may surface. For example, both SWB and suicide rates are positively correlated with individualism (versus collectivism) across societies (Diener and Suh, 1999). Research along this line would aid in understanding how QOL measurements can properly be compared across cultures.

The application of sustainability issues to QOL studies is another avenue of research that is likely to prove integral. Inspection of the list of human needs in Table 1 and recent research (Vemuri and Costanza, *in press*) reveals that Natural Capital is a vital input for QOL. The continuation of the goods and services (including aesthetic) provided by natural ecosystems is a key concern for maintaining life functions. The level and quality of Natural Capital inputs needed and their effect on individual needs and overall QOL are issues that require immediate investigation. Answering the question: “What is the role of ecological sustainability for QOL?” could help integrate the social and scientific policy agendas and hence pay double dividends. An even bigger question involves examining how all of the four capitals, along with their attendant policies and macro-conditions, affect QOL (both directly and in transaction with one another) across temporal and spatial scales. This issue may in fact be the umbrella theme for all future work on the QOL issue.

While this research agenda is not exhaustive, it will likely provide some of the foundational insights needed to make an integrative QOL tool more robust and applicable across temporal, cultural, and spatial scales.

8. Policy implications

The kingdom of Bhutan has recently declared that “gross national happiness” is their explicit policy goal (Bond, 2003). In fact, several authors (including most recently Layard, 2005) have recommend that our primary social policy goal should be the increase in QOL for this and future generations. We agree with Layard and recommend a refocusing of social policy around the goal of long-term, sustainable QOL improvement. As we have discussed, QOL improves according to our abilities to meet human needs as well as our perception of how well

these needs are met. While we cannot directly invest in human needs, we can invest in built, natural, human and social capital in ways that create the opportunities for people to fulfill their needs.

Mainstream economics tells us that efficient investment requires that we allocate resources towards whatever sector will generate the greatest marginal profits and, within a sector, to invest in whatever factor of production will return the highest marginal profit per dollar invested. We can apply the same principle of investing resources where marginal returns are highest to enhance long-term, sustainable QOL. In this case, we should invest our resources to develop opportunities in those human needs (sectors) that provide the greatest return on investment, as measured by increase in QOL. Within each human need, we should strive to invest in the type of capital that will create the greatest amount of opportunity per unit of resource invested.

As we identify the needs in which we should invest (necessarily an ongoing venture given the fluid nature of priorities and fulfillment), we can decide what type(s) of capital will create the most opportunities to fulfill that need for the lowest level of investment. Again, this is a basic principle stemming from law of diminishing marginal utility. Stop investing when the marginal utility equals zero and invest where marginal utility is highest. In a crowded city for example, surveys may indicate dissatisfaction with available natural amenities; hence a good investment might be parks and tree-lined streets. In the rural countryside, built capital may yield the highest return to QOL.

In addition to policy's role in creating and sustaining opportunities, it also can play a role in social norm and preference formation. Social norms evolve over time as function of aggregate but often disparate collective behavior (Young, 1998). This decentralized mechanism may be responsible for generally accepted (but mistaken) beliefs such as "more money means a higher QOL." When this belief is translated into national policy we get policies that focus solely on increasing GDP despite research that shows that increases in individual income have no lasting effect on people's reported level of happiness (Easterlin, 2003).

Therefore, policy can create not only the opportunities for improving QOL but also provide the information crucial to evaluating individual decisions. An integrated QOL measurement tool, such as the one we have described, can aid in identifying apparent discrepancies between policies or lifestyle choices and strategies that actually improve QOL. With this information, policies can be crafted to respond to changing social norms or the reevaluation strategies of individuals. Moreover, policy can actually aid in the evolution of these norms and strategies in a way similar to commercial advertising today (Norton et al., 1998). For example, Easterlin (2003) suggests that if long-term improvement in QOL were the goal, policy would focus more on health and time available for family rather than economic production.

We have proposed an integrated definition and measurement tool for QOL that should guide a stronger research agenda and improve our understanding QOL issues. This improved understanding can in turn be used to guide public policy toward the goal of enhancing QOL across

multiple time and space scales, and across a broad diversity of cultural contexts in a long-term, sustainable manner.

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