



## The Subjective Well-Being Module of the American Time Use Survey: Assessment for Its Continuation

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# **The Subjective Well-Being Module of the American Time Use Survey: Assessment for Its Continuation**

Panel on Measuring Subjective Well-Being in a Policy-Relevant Framework

Committee on National Statistics

Division of Behavioral and Social Sciences and Education

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This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the Report Review Committee of the National Research Council. The purpose of this independent review is to provide candid and critical comments that assist the institution in making its reports as sound as possible, and to ensure that the reports meet institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

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Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. The review of the report was overseen by Edward Perrin (retired), Department of Health Services, University of Washington. Appointed by the National Research Council, he was responsible for making certain that the independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of the report rests entirely with the authoring panel and the National Research Council.

The panel would also like to thank Rachel Krantz-Kent, an economist in the Division of Labor Force Statistics at the U.S. Bureau of Labor Statistics, who attended the panel's first meeting and presented a very informative overview of the American Time Use Survey.





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## Summary

The American Time Use Survey (ATUS), conducted by the Bureau of Labor Statistics, included a Subjective Well-Being (SWB) module in 2010 and 2012; the module, funded by the National Institute on Aging (NIA), is being considered for inclusion in the ATUS for 2013. The National Research Council was asked to evaluate measures of self-reported well-being and offer guidance about their adoption in official government surveys. The charge for the study included an interim report to consider the usefulness of the ATUS SWB module and specifically the value of continuing it for at least one more wave. Among the key points raised in this report are the following:

- Value The ATUS SWB module is the only federal government data source of its kind—linking self-reported information on individuals’ well-being to their activities and time use. Important research has already been conducted using the data (for example, on the effects of unemployment and job search on people’s self-reported well-being), and work conducted with other, similar data sets has indicated the potential of the module to contribute to knowledge that could inform policies in such areas as health care and transportation. While the NRC Panel has not yet concluded its assessment of the policy usefulness of including one or more kinds of self-reported well-being measures on a regular basis in government surveys, it sees a value to continuing the ATUS SWB module in 2013. Not only will another year of data support research, but it will also provide additional information to help refine any SWB measurements that may be added to ongoing official statistics.
- Methodological Benefits A third wave of data collection will enlarge samples by pooling data across years, which will enable more detailed study and comparison than has been possible to date of population subgroups, such as people in a given region and specific demographic groups (e.g., young people, the elderly). Because two new questions—one on overall life satisfaction and one on whether respondents’ reported emotional experiences yesterday were “typical”—were introduced to the module only in 2012, at least one additional wave of the survey is needed to assess changes in responses to those questions over time.
- Cost and Effects on the ATUS As a supplement to an existing survey, the marginal cost of the module, which adds about 5 minutes to the ATUS, is small. While further study of the module’s effects on response and bias in the main ATUS should be undertaken, it appears likely that these effects are modest because the module comes at the end of the survey after people have already been asked to report their activities for the preceding day.
- New Opportunities A third wave of the survey could also be used for experiments to improve the survey structure, should the module become permanent. The ATUS SWB module could be the basis for a standardized set of questions that could be added to other surveys which, together, might provide useful information about the causes and consequences of self-reported well-being in the general population.

## 1. Background and Overview<sup>1</sup>

Research on subjective or self-reported well-being (SWB) has been ongoing for several decades, with the past few years seeing an increased interest by some countries in using SWB measures to evaluate government policies and provide a broader assessment of the health of a society than is provided by such standard economic measures as Gross Domestic Product (see, for example, Stiglitz, Sen, and Fitoussi, 2009). The National Institute on Aging and the United Kingdom Economic and Social Research Council asked a panel of the National Research Council's Committee on National Statistics to review the current state of research knowledge and evaluate methods for measuring self-reported well-being and to offer guidance about adopting SWB measures in official population surveys (see Box 1-1 for the full charge to the panel). NIA also asked the panel to prepare an interim report on the usefulness of the Subjective Well-Being module of the American Time Use Survey (ATUS), with a view as to the utility of continuing the module in 2013.

The SWB module is the only national data source in the United States that links self-reported well-being information to individuals' activities and time-use patterns. It provides researchers with unique insights that are only revealed by melding ratings of affect with time use information. The SWB module, overseen by the Bureau of Labor Statistics (BLS) and sponsored by the National Institute on Aging (NIA), was developed with guidance from several noted academics—Angus Deaton, Daniel Kahneman, Alan Krueger, David Schkade, and Arthur Stone among them—working in the field.

Though the SWB module has only been in existence since 2010, it is not too early to begin assessing its potential value to researchers and policy makers. The purpose of this report is to inform planning discussions about the module's future—it discusses the costs and benefits of a third wave of data collection, whether the survey module should be modified, and whether experiments should be done to improve the module should it become permanent.

This brief report is intended to fulfill only one narrow aspect of the panel's broader task as described in Box 1-1. It provides (1) an overview of the ATUS and the SWB module; (2) a brief discussion of research applications to date; and (3) preliminary assessment of the value of SWB module data. The panel's final report will address issues of whether research has advanced to the point that SWB measures—and which kinds of measures—should be regularly included in major surveys of official statistical agencies to help inform government economic and social policies.

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<sup>1</sup>This section draws heavily from a presentation to the panel by Rachel Kranz-Kent of BLS, and from the *Federal Register*, Volume 76, Number 134 (July 13, 2011): <http://webapps.dol.gov/federalregister/HtmlDisplay.aspx?DocId=25169&AgencyId=6&DocumentType=3> (accessed on August 24, 2012).

### **BOX 1-1 Panel Charge**

An ad hoc panel will review the current state of research and evaluate methods for the measurement of subjective well-being (SWB) in population surveys. On the basis of this evaluation, the panel will offer guidance about adopting SWB measures in official government surveys to inform social and economic policies. The study will be carried out in two phases. The first phase, which is the subject of this statement of task, is to consider whether research has advanced to a point that warrants the federal government collecting data that allow aspects of the population's SWB to be tracked and associated with changing conditions. The study will focus on experienced well-being (e.g., reports of momentary positive and rewarding, or negative and distressing, states) and time-based approaches (some of the most promising of which are oriented toward monitoring misery and pain as opposed to "happiness"), though their connection with life-evaluative measures will also be considered. Although primarily focused on SWB measures for inclusion in U.S. government surveys, the panel will also consider inclusion of SWB measures in surveys in the United Kingdom and European Union, in order to facilitate cross-national comparisons in addition to comparisons over time and for population groups within the United States. The panel will prepare a short interim report on the usefulness of the American Time Use Survey SWB module, and a final report identifying potential indicators and offering recommendations for their measurement. A later, separate second phase will seek to develop a framework modeled on the National Income and Product Accounts to integrate time-based inputs and outputs, and SWB measures, into selected satellite, or experimental, subaccounts.

#### **1.1. Structure and Content of ATUS and the SWB Module**

The ATUS is the first federally administered, continuous survey on time use in the United States (and in the world). It is designed to obtain estimates of the time spent by respondents in childcare, at work, traveling, sleeping, volunteering, engaged in leisure pursuits, and a wide range of other activities. Time-use data augment income and wage data for individuals and families that analysts can use to create a more complete picture of quality of life in a society. Along with income and product data, information about time-use patterns is essential for research that evaluates the contribution of nonmarket work to national economies. The data also enable comparisons between nations that have different mixes of market and nonmarket production modes. To illustrate, the households of two countries may enjoy similar home services and amenities—quality of meals, level of home cleaning and maintenance, elder and child care, etc.—but one may perform more of these tasks themselves (home production) while the other may more typically hire the tasks out in the market. The latter economy will register higher per capita gross domestic product even though the standard of living may be comparable in the two countries. Relatedly, countries may vary in the amount of time that individuals must work to achieve a given material standard of living, resulting in different amounts of leisure. This difference would also not show up directly in market (only) measures of economic activity, yet it is likely that it affects well-being.

The ATUS provides nationally representative estimates of how people spend their time. It has been conducted continuously since 2003. The survey sample is a repeated cross-section of individuals who are drawn from U.S. households completing their eighth and final month of interviews for the Current Population Survey (CPS). One individual from each household is

selected to take part in one computer-assisted telephone interview. Respondents are interviewed for the ATUS between two and five months after they rotate out of the CPS.

Interviewers ask respondents to report all of their activities for one specified 24-hour day, the day prior to the interview. Respondents also report who was with them during activities, where they were, how long each activity lasted, and if they were paid. For the ATUS (following the core time diary questions but prior to the SWB module) some of the CPS information—for example about who is living in the household and labor force status—is confirmed and updated.<sup>2</sup> Measurement of socioeconomic well-being based on the ATUS is enhanced by its connection to the CPS which is rich in socio-demographic variables—namely, characteristics of the individual and the household including labor force status, income, state of residence, educational attainment, race and ethnicity, nativity, detailed marital status (divorced, never married, etc.), and disability status.<sup>3</sup>

The SWB module adds to the substantive content of the ATUS by revealing not only what people are doing with their time, but also how they experience their time—specifically how happy, tired, sad, stressed, and in pain they felt while engaged in specific activities on the day prior to the interview.<sup>4</sup> This information has numerous practical applications for sociologists, economists, educators, government policy makers, businesspersons, health researchers, and others. The module follows directly after the core ATUS; it was administered on an ongoing basis during 2010 and is being done again during 2012. The module surveys individuals aged 15 and over from a nationally representative sample of approximately 2,190 households each month.

Respondents are asked questions about three activities selected with equal probability from those reported in the ATUS time diary (the well-being module questions are asked immediately after the core ATUS) (see Box 1-2). A few activities—sleeping, grooming, and private activities—are never included in the SWB module. The time diary refers to the core part of the ATUS, in which respondents report the activities they did from 4 a.m. on the day before the interview to 4 a.m. on the day of the interview. The precodes listed in Box 1-2 are for activities that are straightforward to code, but they are in no way representative of the full activity lexicon used by ATUS coders. The vast majority of ATUS activities are typed into the collection instrument (verbatim) and then coded in a separate processing step.<sup>5</sup> The module also collects data on whether respondents were interacting with anyone while doing the selected activities and how meaningful the activities were to them.

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<sup>2</sup>Technical details of the sample design and the survey methodology can be found in the *American Time Use Survey User's Guide: Understanding ATUS 2003-2011* Available at: <http://www.bls.gov/tus/atususersguide.pdf> (accessed on September 3, 2012).

<sup>3</sup>Information about who is living in the household and about labor force status is updated in the ATUS, which is important since the CPS data are a little dated by the time the ATUS interview takes place.

<sup>4</sup>The module questionnaire can be found at <http://www.bls.gov/tus/wbmquestionnaire.pdf> [August 2012].

<sup>5</sup>There are more than 400 possible activity codes; a full list can be found at <http://www.bls.gov/tus/lexiconnoex2011.pdf> (accessed on June 27, 2012).

**BOX 1-2**  
**ATUS Question Identifying an Activity**

**So let's begin. Yesterday, Monday, at 4:00 a.m., what were you doing?**

- Use the slash key (/) for recording separate/simultaneous activities.
  - Do not use precodes for secondary activities.
1. Sleeping
  2. Grooming (self)
  3. Watching TV
  4. Working at main job
  5. Working at other job
  6. Preparing meals or snacks
  7. Eating and drinking
  8. Cleaning kitchen
  9. Laundry
  10. Grocery shopping
  11. Attending religious service
  12. Paying household bills
  13. Caring for animals and pets
  14. Don't know/Can't remember
  15. Refusal/None of your business

Respondents are asked to rate, for each of the three randomly selected activities, six feelings—pain, happy, tired, sad, stressed, and meaningful—on a scale from 0 to 6: 0 means the feeling was not present, and 6 means the feeling was very strong.

**BOX 1-3**  
**ATUS SWB Text Asking Respondents to Rate Strength of  
Feeling During Specific Activities**

Between 12:00 p.m. and 1:00 p.m. yesterday, you said you were eating and drinking. The next set of questions asks how you felt during that particular time.

Please use a scale from 0 to 6, where 0 means you did not otherwise experience this feeling at all and a 6 means the feeling was very strong. You may choose any number 0, 1, 2, 3, 4, 5, or 6 to reflect how strongly you experienced this feeling during this time.

The following health related questions (paraphrased here) are also asked after the three random activity episodes are chosen:

- Did you take pain medication yesterday?
- When you woke up yesterday, how well rested did you feel?



- Do you have hypertension?
- Would you say your health in general is excellent, very good, good, fair, or poor?

This information creates opportunities to analyze interactions between health states and reported assessments of emotional states. This is important because daily experience is linked to health status and other outcomes via channels such as worry and stress on the one hand, and pleasure and enjoyment on the other.

## 1.2. Objectives of the SWB Module

The ATUS SWB module was initially designed to collect information primarily on experienced (“hedonic”) well-being—that is, about people’s emotions associated with a recent time period and the activities that occurred during that period. The hedonic dimension of well-being is directly related to the environment or context in which people live—the quality of their jobs, their immediate state of health, the nature of their commute to work, and the nature of their social networks—and is reflected in positive and negative affective states. These kinds of hedonic measures contrast with self-reported assessments of overall life satisfaction or happiness. Such “evaluative” well-being measures are more likely to reflect people’s attitudes about their lives as a whole.

The first, 2010, module included only hedonic measures. The second wave (conducted in 2012) includes two additional questions, one on overall life satisfaction and one on whether or not recent emotional experience was typical. The life satisfaction responses are collected using the Cantril ladder scale.<sup>6</sup> As noted on the BLS supporting statement for the project (p. 2), asking the Cantril ladder question enables researchers “to build a link between time use and day reconstruction methods of measuring well-being on the one hand, and standard life evaluation questions on the other . . . a direction of research that has not been possible to date.” The life evaluation question enhances the value both of the ATUS supplement and other surveys that use a Cantril ladder question.

Measurement of both *experienced* well-being (i.e., reports of momentary positive and rewarding or negative and distressing states) and *evaluative* well-being (i.e., cognitive judgments of overall life satisfaction or dissatisfaction) extends the policy value of the SWB module data. The value added comes from what can be learned from differences between what the two measures show. For example Kahneman and Deaton (2010, p. 1) find that “emotional well being and life evaluation have different correlates in the circumstances of people’s lives” and particularly striking “differences in the relationship of these aspects of well being to income.”

Distinguishing between different dimensions of well-being also allows investigation of psychological changes associated with aging (e.g., reduced mobility) that might affect both these dimensions of well-being. Another area where the two dimensions provide complementary information is job satisfaction. Getting promoted or obtaining a new job that

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<sup>6</sup>The Cantril Self-Anchoring Scale asks respondents to imagine a ladder with steps numbered from 0 at the bottom to 10 at the top, in which the top of the ladder represents the best possible life for them and the bottom of the ladder represents the worst possible life. They are asked which step of the ladder they personally feel they stand on at this time (for a present assessment). For a good description and discussion of the Cantril Scale, see Diener et al. (2009).

entails long hours might raise a worker's evaluative well-being, but the associated stress might reduce experienced well-being, at least in the short term. Similar comparisons could be made across professions. Respondents' reported differences between experience and evaluative measures might also help explain why some people attach high meaning to work, career, and related time commitments while others focus more on simple day-to-day contentment and how or if these correlations vary across age, income, and other demographic or cohort factors. For education research, measures of multiple dimensions of subjective well-being may help provide an understanding of why students make (or do not make) the investments in schooling choices that they do (or do not) make.

The second new question for 2012 asks whether the respondents' emotional experience yesterday (the day before the interview) was typical for that day of the week:

Thinking about yesterday as a whole, how would you say your feelings, both good and bad, compared to a typical Monday? Were they better than a typical Monday, the same as a typical Monday, or worse than a typical Monday (respondents answer "better," "the same," or "worse").

This question may provide insights about day of week effects and day to day variation in reported well-being scores.

### 1.3. Uses of Data on Subjective Well-Being

Data from the SWB module supports the BLS mission of providing relevant information on economic and social issues. The data provide a richer description of work experience; specifically, these data describe how individuals feel (tired, stressed, in pain) during work episodes compared to non-work episodes, and how often workers interact on the job. Data from the module can also be used to measure whether the amount of physical pain that workers experience varies by occupation and disability status. The fact the SWB module can be linked to demographic characteristics of respondents—labor force status, occupation, earnings, household composition, school enrollment status, and other characteristics captured on the core ATUS and CPS—opens up a wide array of possible studies on the correlates of self-reported well-being.<sup>7</sup>

Collection of data on subjective well-being also supports the mission of the module's sponsor, the National Institute on Aging (NIA), to improve the health and well-being of older Americans. Examples of questions that can be answered include:

- Do older workers experience more pain than younger workers on and off the job?
- Is the age-pain gradient related to differences in activities or differences in the amount of pain experienced during a given set of activities?
- Do those in poor health spend time in different activities relative to those in good health?

To date, much of the research on nonmarket components of health and well-being has been informed by global assessments of positive or negative affect averaged over time that are divorced from measures of time use or context. Nor has that research typically addressed age differences or age-related changes in these associations. In this vein, data from the SWB

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<sup>7</sup>In addition, because the ATUS is conducted through the year, it is possible to study seasonal effects on well-being—a topic of interest in a number of research areas.

module might inform policies on redesigning cities to support healthy aging, the allocation of funds to programs that affect older populations, and changes to the health care system to support better maintenance of good health. Researchers have already begun to explore which aspects of experienced and evaluative well-being, time use, and context promote or impede healthy aging. Further work can be done to examine the unique correlative and predictive associations of evaluated and experienced well-being with health and with differences related to life stage, retirement status, and individual characteristics.

## 2. Ongoing and Potential Research Applications

Compelling evidence indicates that higher levels of subjective or self-reported well-being are associated with a range of desirable outcomes, from better health and greater longevity to stable social relationships and even to economic productivity. Daily stress, for example, has been shown to correlate quite strongly with illness, and higher levels of hedonic well-being (positive feelings) with lower incidence of cardiovascular disease (Boeham and Kubzansky, 2012; Huppert, 2009). Based on the current evidence, generated from research using a variety of methods, one could even reasonably conclude that SWB is likely a causal factor for some health outcomes. This in itself is a compelling reason to gather data on and analyze the subjective-well-being of the population.

Though data from the 2010 ATUS SWB module have only been publicly available since November 2011 (2012 data will not be available until next year), research using those data is already emerging. This section identifies some of that work to provide a sense of the range of applications.

### 2.1. Time Use, Emotional Well-Being, and Unemployment

In an analysis of the differences in time use and emotional well-being between employed and unemployed people—for specific activities identified using the ATUS sample—Kreuger and Mueller (2012) show that the unemployed get less enjoyment out of leisure and report higher levels of sadness during specific activities relative to employed (the sadness decreases abruptly at the time of employment).<sup>8</sup> This study leans more heavily on data from the Survey of Unemployed Workers in New Jersey since its longitudinal structure, in contrast to the repeated cross-sectional measurement in ATUS, allows consideration of fixed effects—that is, to look at *within* group variation—but is indicative of the importance of being able to link data on subjective well-being to specific events.

### 2.2. Assessing Validity of Short Versions of the Day Reconstruction Method (DRM)

Vicki Freedman, Richard Gonzalez, Lindsay Ryan, Norbert Schwarz, Jacqui Smith, and Robert Stawski, are comparing DRM—which involves asking respondents to reconstruct and describe episodes of the previous day and the feelings they experienced during each—with shorter survey approaches that retain a subset of DRM features.<sup>9</sup> This work is comparing findings from the Health and Retirement Study (HRS) with DRM data collected in the Panel Study of Income Dynamics (PSID), the ATUS SWB module, and the American Life Panel.<sup>10</sup>

<sup>8</sup>More generally, the ATUS SWB module has the potential to add richness to research on trends in leisure and leisure inequality (see, e.g., Aguiar and Hurst, 2007) and on the link between leisure and well-being (see, Meyer and Sullivan, 2009, which examines changes in the distribution of well-being as a function of not just consumption of goods and services, but also consumption of time, by incorporating information based on self-reported measures.

<sup>9</sup>A brief description of this research in progress can be found at <http://micda.psc.isr.umich.edu/project/detail/35382> (accessed July 17, 2012).

<sup>10</sup>One appealing argument for collecting time-use and hedonic data through an approach like that of the day reconstruction method is that it can then be used to compute other measures of

The minimum features necessary for a short, reliable, and valid survey index of experienced well-being are unknown, though the target length of a survey measure being tested in their study is 3–5 minutes.

This kind of evaluation is central to determining how broadly subjective measures can potentially be integrated into policy analyses and national statistics. Adding a standardized – (employment, etc.) is necessary for understanding covariates of (and developing statistics on) population well-being. However, such an integrated strategy will only be feasible if the modules are minimally burdensome and retain validity across contexts and if the short-version questionnaires are sufficiently robust in the information they produce.

### 2.3. Episode-Based Pain Studies

Two additional sets of analyses that use ATUS or ATUS-like data are worth noting because they provide an indication of potential uses of data from the SWB module. In a recent study, Krueger and Stone (2008) measured pain during specific random periods of time, which allowed them to study how reported (recalled) levels of pain affected activities of daily living in particular segments of the sample population. This approach is novel relative to the global assessment methodologies typically used in population studies. The authors used data from the Princeton Affect and Time Survey (PATS), which employs a similar data collection methodology and the same general procedures as ATUS: “yesterday” is reconstructed through computer-assisted telephone interviews, and then three episodes from those identified are randomly drawn and information is collected about affect and pain.

Similar studies could be done even more robustly using ATUS, as PATS allowed only 3,982 respondents, while there were more than 12,000 in the 2010 ATUS sample. In addition, the PATS sample was likely less representative than the ATUS sample. Even with these limitations in PATS (relative to ATUS), the finding from this study were clear and robust: one was that those with lower income or less education reported higher average pain than did those with higher income or more education, and another was that average pain ratings reached a plateau between the ages of about 45 years and 75 years. The results of this study suggest even greater potential for the value of ATUS for pain studies—an area where there is an increasing demand for research.

Stone and Deaton have recently begun work, using the 2010 SWB module data, to examine the hypothesis that people with different employment status (working/nonworking) and occupations (using standard labor categories) experience different levels of pain throughout the day—and not just on the job.<sup>11</sup> Possible explanations for variation in reported pain levels include the differing physical demands of different occupations; these pain-occupation relationships may vary by age or gender. The researchers first examined pain, rated on a scale from 0 (did not feel any pain) to 6 (severe pain), for a broad employment status variable. They found those who were employed had less pain than those who were unemployed and were looking for work or who

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experienced well-being such as the U-index, which measures the proportion of time individuals spend in an “unpleasant,” “undesirable,” or “unhappy” state (see Krueger and Stone, 2008). A focus on the U-index would be justified if policy makers want to pay attention to the incidence of negative feelings and their health and other consequences.

<sup>11</sup>This work is being done by Arthur Stone (Stony Brook University) and Angus Deaton (Princeton University).

were retired or disabled. People in management, business, and financial occupations had lower pain levels than almost all of the other occupational categories (controlling for age and sex). People in occupations that are judged as having higher levels of manual labor also reported more daily pain. Pain was also higher on average during times respondents reported being at work in comparison with other activities. Other aspects of hedonic well-being—e.g., specific emotions, such as stress or enjoyment—may ultimately be examined in much the same way.

Similarly, it is possible to test if pain was higher at work or during periods not at work, and whether or not this distinction interacted with type of occupation: Do those with physically demanding jobs experience more pain on the job than when not working? Is this pattern less pronounced for less physically demanding occupations? These analyses have begun to reveal the capability of the detailed, daily data of the ATUS to address both between- and within-subjects questions, and highlight the richness of the data.

## 2.4. End-of-Life Care

Various well-being measures have been used for some time to supplement measures of objective health in clinical and epidemiological research, particularly by those interested in broadening the concept of health beyond the absence of illness to include the presence of positive health, functioning, and other quality-of-life dimensions.

Policies oriented toward improving care for the chronically ill or for end-of-life care, for example, could benefit from better data on the impact that various treatments have on patients and on their families and careers. Data on subjective well-being could be useful in this area, especially for monitoring those who are providing care, such as family members. The data could identify where targeted studies are needed, such as when quality is at least as important as quantity of life. The distinction between hedonic well-being and other dimensions of well-being addressed in the 2012 SWB module may be especially important for the end of life, when the balance between predominantly purposeful and pleasurable activities might change.

In addition, the well-being of eldercare providers is of interest to policy makers because the elderly population is growing, along with a reliance on informal care providers to assist them. Researchers may be able to take advantage of a change that was made to the ATUS in 2011, when questions that identify eldercare providers and eldercare activities were added.

## 2.5. Transportation

Transportation has been identified as a potentially key determinant in the quality of people's lives. For example, when the transportation infrastructure is of poor quality or overcrowded, congestion and unreliable travel times inhibit the ability of individuals to engage in enjoyable or productive activities. Therefore, modeling the relationship between travel behavior and activities with measures of well-being represents a potential policy application of time use and well-being data (Diener, 2006; Steg and Gifford, 2005). Archer et al. (2012, p. 1) describe how transportation forecasting models may be used to help inform policy and investment decisions; they use the 2010 ATUS and SWB module data to develop a multivariate model designed to “capture the influence of activity-travel characteristics on subjective well-being while accounting for unobserved individual traits and attitudes that predispose people when it comes to their emotional feelings.” They find that “activity duration, activity start time, and child accompaniment significantly impact feelings of well-being for different activities” (including

travel). The authors add that “by integrating the well-being model presented in this paper with activity-based microsimulation models of travel demand, measures of well-being for different demographic segments may be estimated and the impacts of alternative policy and investment decisions on quality of life can be better assessed.”

### 3. Assessment

#### 3.1. Value of the SWB Module Data to Date

It is still early to gauge the research and policy value of data emerging from the ATUS SWB module. Even so, the kinds of research described above provide a preliminary indication of the insights that can be drawn from the ability to combine time-use information (as it links to specific activities) and self-assessments of well-being during those periods, which have relevance to policies ranging from commuting and home production to eldercare and maintaining good health. Without established and consistent historical data that combine time use and emotional experience, researchers would be limited to analyzing trends in evaluated time use that are difficult to tie to specific determinants.

Several characteristics of the SWB module data contribute to its value:

- Its status as the only national data source on subjective well-being that is linked to activities and time use.
- Its Day Reconstruction Method (DRM)-like capability, unavailable with most other data sources on subjective well-being.
- Its large enough sample sizes (especially if pooled over multiple survey years) to accommodate analyses of important subgroups of the population.
- Its ability to facilitate research to begin solving difficult measurement and conceptual issues that have historically plagued work on subjective well-being.

The fact that the ATUS SWB module is the only federal government data source of its kind gives it a potentially very high value. In particular, its approximation of the DRM is unique.<sup>12</sup> As described above, linking of emotional states to daily experience may be the most directly relevant dimension of subjective well-being to policy. It is important to know how people feel when they are working, commuting, taking care of the old and the young, etc. In addition, identifying the context in which such activities take place, and asking respondents to rate well-being in that context (in the case of the ATUS, of the previous day) has the advantage of eliciting specific memories and, in turn, reducing bias associated with respondent recall.

More generally, there has been enough progress in research on the measurement of subjective well-being to pinpoint specific policy domains and questions for which such data are useful. For example, cross-sectional data have proven important for research assessing the

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<sup>12</sup>The day reconstruction method is itself an approximation of more time-consuming experience sampling and ecological momentary assessment methods; however, the day reconstruction method captures information about *episodes* while the ecological momentary assessment method typically captures information about *moments* (Christodoulou, Schneider, and Stone, 2012). Simplified versions of the experience sampling and ecological momentary assessment methods—which, in some, sense represent the gold standard since they involve repeated assessment in real time of people’s current hedonic well-being—are necessitated by burden, time, and intrusiveness constraints in surveys. Though research is under way on the issue, it is still an open question how well, and under what conditions, the day reconstruction method approximation is adequate and useful.



relative impact on people of income and unemployment<sup>13</sup> and marriage and marital dissolution (Deaton, 2011, p. 50) and, more generally, on the effect of policies where large nonmarket components are involved (e.g., standard of living during end-of-life medical treatment). Data on subjective well-being have the potential to augment information in any situation in which market data are unavailable or not relevant and policy makers require criteria for choosing one course of action among two or more alternatives. In these cases, a range of evidence—revealed preference, stated preference, and subjective well-being measures—can usefully be drawn upon. And well-being measures that are tied to specific activities add a great deal of subtlety to these analysis; for example, while perhaps unemployed persons are able to engage more in activities they like to do (spend time with friends or relatives, rest, watch television, etc.), perhaps they enjoy each of those activities less relative to the employed.

It will be a task for this Panel's final report to provide an assessment of the extent to which subjective measures—including both global, evaluative measures and the more experiential measures that are the focus of this module—can or should be used to guide policy. Collecting data within the context of the ATUS has the potential to help researchers and policy makers evaluate whether these measures can be used in this way.

### 3.2. Cost of Discontinuing the Module

The cost of discontinuing the module could be large since—if the value of such data became more apparent at some point in the future—restarting the survey would likely entail repeating start-up tasks and drawing again on political capital to make it happen. More importantly, the data continuity that is now being established (with the 2010 and 2012 waves and the proposed 2013 wave) would be lost, affecting the ability of researchers to draw inferences from trends in reported time use and well-being.

On the budget side, the marginal financial cost of adding the developed module to ATUS is relatively modest—about \$178,000.<sup>14</sup> That said, it would be useful to perform a full accounting to assess the quality of survey results and any effects that the addition of the SWB module may have on the quality of the overall CPS and ATUS. At least in terms of respondent burden and response rates, these concerns would seem to be modest for the former and unfounded for the latter. Indeed, by design, the ATUS is asked of those who have rotated out of the CPS, and modules are asked after the core ATUS is completed. This design element prevents modules from impacting response to the core ATUS and CPS.<sup>15</sup> Because the SWB questions are the last

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<sup>13</sup>One could reasonably conclude that addressing the recent high rate of unemployment was made even more urgent by findings from research on subjective well-being showing that, in terms of individuals' utility, more was involved than simply an income effect. As Krueger and Mueller (2012) note, unemployment takes an emotional toll on people even while they are engaged in leisure activities. This calls into question an earlier conclusion by economists that people's decreases in well-being because of unemployment may be partially compensated by increases in leisure.

<sup>14</sup>The monetary cost of the 2012 module was higher (\$273,000) as it included cognitive testing, data editing, interviewer training, and call monitoring activities by BLS.

<sup>15</sup>If ATUS interviewers indicated that the survey will take 5 minutes longer, addition of the module could affect people's willingness to participate (unit response rates). ATUS response

thing the respondent hears, the impact on the core ATUS is expected to be minimal. Similarly, the SWB module cannot, by design, bias the core diary responses. On the respondent burden question, for the 2012 SWB module, average time spent was approximately 5 minutes, which adds up to an estimated 1,100 hours for the 12,800 respondents (*Federal Register*).

### 3.3. Value of a Third Wave

A third wave of data collection will add significant information beyond what has been collected so far. Most obviously, another year for the survey means an increased capacity for researchers to enlarge samples by pooling data across years. For some purposes—for example, to look at well-being effects associated with changes in employment during recessions (only a small percentage of the population is unemployed) or to investigate differences across population subgroups—the number of observations needed to make valid statistical inferences well exceeds the annual sample size. This is especially true for comparing self-reported well-being score across smaller population subgroups. Almost all of the research to date using ATUS—which covers a wide range of topics, from household production, to work and leisure patterns, to childcare issues—has pooled data across years to increase the robustness of the statistical estimates.<sup>16</sup> The need to enlarge samples (pool data) will be true for research applications that rely on the SWB module of the ATUS as well.

Crucially, the 2012 module (the second wave) is only the first version of the survey that asks the overall life satisfaction (evaluative) well-being questions. In order to begin looking at sensitivity of measures and changes over time in these questions, at least one additional round of the survey—and ideally several more—are needed. A 2013 module would effectively double the sample size of respondents who have answered the evaluative well-being questions.

Fielding another round of the SWB module will also add to the accumulating evidence needed to determine the value of incorporating it into the ATUS (and possibly elsewhere) on something more than an experimental basis. More generally, continuing the module will encourage discussion of how measures of subjective well-being can play a useful role in assessing the effects of public policies. On the research side, a third wave of data may shed light on unanswered questions about survey issues, data quality, and reliability (e.g., nonresponse bias, question ordering, context effects). Other technical issues that could be studied include mode of administration effects (is reported well-being lower in face-to-face interviews than for telephone or internet modes?); activation/valence (are positive and negative affect two ends of the same bipolar dimension or are they separable unipolar dimensions? scaling (do populations from difference cultures or age groups systematically respond differently? and memory bias (e.g., are negative events reported more or less frequently than positive events?).

A third wave of the survey could also be used to explore opportunities for experimentation designed to move toward an optimal survey structure, should the module become a permanent biannual ATUS supplement. Although it is unlikely that major changes could be made for a 2013 module, in the longer term it is certainly worth considering whether

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rates have ranged from 52.5 to 57.8 percent. The response rates for 2010 (the first year of the SWB Module) was 56.9 percent.

<sup>16</sup>A bibliography of research that has used ATUS data can be found at <http://ideas.repec.org/k/atusbib.html> (accessed August 7, 2012).

modifications could be made to increase its value. Examples of possible modifications to consider include

- Split sample surveys—one half the respondents could receive one question while the other half gets another; this would be useful for testing such things as sensitivity to different scales and question wording.<sup>17</sup>
- Finding the optimal number of activities to ask about. It is not obvious that three activities is the optimal number of activities to include on the module. It may be useful to ask about hedonic well-being associated with more activities in order to increase the reliability of daily estimates. Importantly, sampling more episodes increases the power to examine activity-specific effects, which may be particularly valuable for addressing policy questions. Doubling or even tripling the number of episodes may be cost-effective, although that benefit would have to be weighed against considerations of participant burden and the potential impact on response rates.
- Selecting the “right” positive and negative emotion adjectives for module questions. Research supports the separation of positive and negative states but, more generally, should the module be focused more on suffering or happiness. The module could experiment with different adjectives and how interpretation varies across populations.
- Expanding coverage to pain and other sensations. There are no good conceptual criteria for differentiating between sensations and “pure” emotional states or for how the two link together. Intuitively, sensations are principally physiological states, in contrast to such feelings as anxiety, stress, and joy, which are principally subjective states.
- Additional or replacement questions for consideration. A possible example is adding a question or two about sleep, such as: “How many hours of sleep do you usually get during the week?” or “How many hours of sleep do you usually get on weekends?” The objective of such questions would be to find out if respondents’ reports about behaviors/emotions—feeling happy, tired, stressed, sad, pain—are influenced by (chronic) sleep deprivation or other sleep patterns.<sup>18</sup> A methodological question is how well do people recall the previous night’s sleep?
- Selecting among competing evaluative measures. Is the current Cantril approach, which is perhaps the most remote from affect measures, optimal? Alternative versions of the evaluative measure are common in the literature.

It would also be interesting to make modifications to the SWB module so that day-of-week effects could be tested for different domains—health, education, transportation, etc.

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<sup>17</sup>In its well-being survey, the United Kingdom’s Office of National Statistics has used, or plans to use, split trials to test for such things as sensitivity to different scales, question wording, and order and placement of questions.

<sup>18</sup>This idea was raised by Mathias Basner, of the University of Pennsylvania School of Medicine, who noted that self-assessments of habitual sleep time overestimate physiological sleep time and that estimates of habitual sleep time based on ATUS overestimate self-assessments of habitual sleep times found in other population studies. Therefore, he suggested that it would be “very elucidating” to compare self-assessments of sleep time for the two questions above against estimates based on ATUS responses for the day before the interview day.

The merits of retaining some fraction of the sample for experimental work should be strongly considered, presumably not for 2013 but for subsequent years. One such experiment would be to determine sample sizes needed for subgroup analyses (e.g., day reconstruction method questions, which rely some recall, are systematically answered differently by older and younger populations; in an aging society, it is important to be cognizant of these effects).

The ATUS SWB questions could be the model for a standard set of questions that could be added to other surveys. With effective data linking, this could yield a rich set of findings about the relation to SWB of a wide range of covariates. If such a strategy were adopted, the experience of the ATUS SWB module will provide insights about how questions might perform on health, economic, and other kinds of surveys; and for determining candidate surveys such as the National Health Interview Survey and the National Health and Nutrition Examination Survey, administered by the National Center for Health Statistics, and the Survey of Income and Program Participation, administered by the U.S. Census Bureau for adding modules. As noted above, there are potentially major advantages in having similar questions embedded across multiple surveys, especially as linking of microdata (including administrative) records becomes increasingly feasible.

In light of changing budgets and priorities and emerging alternative data sources (e.g., private label, digital, Web-based), the nation's statistical agencies have already begun to reexamine the content, modes, and structure of their surveys and data programs more intensively than ever before. New scrutiny of what trends in society are important to measure (such as those recommended by the Commission on the Measurement of Economic Performance and Social Progress; Stiglitz, Sen, and Fitoussi, 2009) may give rise to new opportunities to refocus statistical program coverage (and the surveys on which they are built) and to move into new research areas surrounding SWB. Smaller-scale studies and data collections, such as the ATUS SWB module, are needed to help judge the value and feasibility of embarking on production of national-level SWB statistics, such as those under development in the United Kingdom. Moreover, determination of the place of measures of subjective well-being in monitoring the economy and society cannot be done without the data. The question of whether self-reported measures of well-being should one day be reported alongside more standard economic statistics, such as those for income and employment and for financial markets, is as yet unanswered.

A careful assessment of the data emerging from ATUS and the SWB module may help avoid mistakes if self-reported well-being statistics are ever produced on a larger scale. To the extent that evidence can be accumulated on the research and policy value of such data, a better basis for making these data collection and statistical program decisions can be established. The fact that the United States has a decentralized statistical system makes coordinating of the survey content related to subject well-being a greater challenge than in countries with centralized statistics systems. However, it also affords the option of targeting development in the areas that are identified as the most relevant for policy and measurement—such as health, employment, or education—for which the argument is strongest for adding this kind of content. In light of these arguments, it is the view of the panel that the cost of the proposed 2013 SWB module is quite modest given its potential to inform decisions about potentially much larger statistical system investments.

## References

- Aguiar, M., and Hurst, E. (2007). Measuring trends in leisure: The allocation of time over five decades. *The Quarterly Journal of Economics*, 122(3), 969–1006, 1008.
- Archer, M., Paleti, R., Konduri, K., and Pendyala, R. (2012). “Modeling the connection Between Activity-Travel Patterns and Subjective Well-Being. Submitted for Presentation and Publication, 92nd Annual Meeting of the Transportation Research Board.
- Boeham, J.K., and Kubzansky, L.D. (2012). The Heart’s Content: The Association between Positive Psychological Well-Being and Cardiovascular Health.” *Psychological Bulletin*, online April 17, 2012. Available: <http://www.rwjf.org/pioneer/product.jsp?id=73919> (accessed September 7, 2012).
- Christodoulou, C., Schneider, S., and Stone, A. (2012). *Validation of a Brief Yesterday Measure of Hedonic Well-Being and Daily Activities: Comparison with the Day Reconstruction Method*. Working Paper, June 4.
- Deaton, A.S. (2011). *The Financial Crisis and the Well-Being of Americans*. NBER Working Papers 17128. National Bureau of Economic Research, Inc. Available: <http://www.nber.org/papers/w17128> (accessed July 29, 2012).
- Diener, E. (2006). Guidelines for national indicators of subjective well-being and ill-being. *Applied Research in Quality of Life*, 1(2), 151–157.
- Diener, E., Kahneman, D., Tov, W., and Arora, R. (2009). Income’s Differential Influence on Judgments of Life Versus Affective Wellbeing. *Assessing Wellbeing*. Oxford, UK: Springer.
- Huppert, F.A. (2009). Psychological well-being: Evidence regarding its causes and consequences. *Applied Psychology: Health and Well-Being*, 1, 137–164.
- Kahneman, D., and Deaton, A. (2010, August). High Income Improves Evaluation of Life but not Emotional Well-Being. *Proceedings of the National Academy of Science*.
- Krueger, A.B., and Mueller, A. (2012). Time use, emotional well-being and unemployment: Evidence from longitudinal data. *American Economic Review*, 102(3), 594–599.
- Krueger, A.B., and Stone, A.A. (2008). Assessment of pain: A community-based diary survey in the USA. *Lancet*, 371(May 3), 1519–1525.
- Meyer, B.D., and Sullivan, J.X. (2009). Economic Well-Being and Time Use. Working paper, June 22.
- Steg, L., and Gifford, R. (2005). Sustainable transportation and quality of life. *Journal of Transport Geography*, 13(1), 59–69.
- Stiglitz, J., Sen, A., and Fitoussi, J.P. (2009). *Report by the Commission on the Measurement of Economic Performance and Social Progress*. Available: [http://www.stiglitz-sen-fitoussi.fr/documents/rapport\\_anglais.pdf](http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf) (accessed August 2, 2012).

## APPENDIX

### Biographical Sketches of Panel Members

**ARTHUR A. STONE** (*Chair*) is distinguished professor of psychiatry and psychology, vice chair of the Department of Psychiatry and Behavioral Sciences, and director of the Applied Behavioral Medicine Research Institute, all at Stony Brook University. He is also a senior scientist at Gallup. He specializes in the field of behavioral medicine, focusing on stress, coping, physical illness, and self-report processes. He also works with Gallup researchers to explore how employee engagement relates to worker's physical health and well-being. He has been an executive council member for the American Psychosomatic Society, a research committee member for the American Psychological Association, and a past president and executive council member of the Academy of Behavioral Medicine Research. He holds membership to the American Psychological Society, the Society for Behavioral Medicine, and Academy of Behavioral Medicine Research, among others. He has a B.A. degree from Hamilton College and a Ph.D. degree in clinical psychology from Stony Brook University.

**NORMAN M. BRADBURN** is the Tiffany and Margaret Blake distinguished service professor emeritus, at the University of Chicago, where he also serves on the faculties of the Department of Psychology, the Irving B. Harris Graduate School of Public Policy Studies, the Booth School of Business, and the college. He is also a senior fellow at the university's National Opinion Research Center and serves on the board of directors of the Chapin Hall Center for Children. He previously served as assistant director for social, behavioral, and economic sciences at the National Science Foundation. His research focuses on psychological well-being and the assessment of quality of life using large-scale sample surveys. He is a past president of the American Association of Public Opinion Research. He has an M.A. degree in clinical psychology and a Ph.D. degree in social psychology, both from Harvard University.

**LAURA L. CARSTENSEN** is professor of psychology, the Fairleigh S. Dickinson Jr. professor in public policy, and the founding director of the Stanford Center on Longevity, all at Stanford University. Much of her work has focused on socioemotional selectivity theory—a life-span theory of motivation. Her most current empirical research focuses on ways in which motivational changes influence cognitive processing. She is a fellow of the Association for Psychological Science, the American Psychological Association, and the Gerontological Society of America, and she serves on the board of science advisors to the Max Planck Institute for Human Development in Berlin, Germany. She is the recipient of the Richard Kalish award for innovative research and the distinguished career award from the Gerontological Society of America, Stanford University's dean's award for distinguished teaching, and a MERIT (Method to Extent Research in Time) Award from the National Institute on Aging. She has a B.S. degree in psychology from the University of Rochester, an M.A. degree in developmental psychology, and a Ph.D. degree in clinical psychology, both from West Virginia University.

**EDWARD F. DIENER** is the Joseph R. Smiley distinguished professor of psychology in the Department of Psychology at the University of Illinois at Urbana-Champaign and a senior scientist at the Gallup Organization. His research focuses on the measurement of well-being, temperament and personality influences on well-being, theories of well-being, income and well-

being, and cultural influences on well-being. He has served as president of the International Society of Quality of Life Studies, the Society of Personality and Social Psychology, and the International Positive Psychology Association. Among his many awards are an honorary doctorate from the University of Berlin and a distinguished scientist award from the International Society of Quality of Life Studies. He won the distinguished researcher award from the International Society of Quality of Life Studies, the first Gallup academic leadership award, and the Jack Block award for personality psychology. He has a B.A. degree in psychology from the California State University of Fresno and a Ph.D. degree in psychology from the University of Washington.

**PAUL H. DOLAN** is a professor of behavioral science in the Department of Social Policy at the London School of Economics and Political Science. He is also chief academic adviser on economic appraisal for the Government Economic Service in the United Kingdom. Previously, he held academic posts at the universities of York, Newcastle, Sheffield, and Imperial, and he has been a visiting scholar at Princeton University. His research interests focus primarily on developing measures of subjective well-being that can be used in policy, particularly in the valuation of nonmarket goods and in extending the ways in which the lessons from behavioral economics can be used to understand and change individual behavior. He is a recipient of the Philip Leverhulme Prize in economics—awarded by the Philip Leverhulme Trust in the United Kingdom—for his contribution to health economics. He has served on many expert panels for various government departments in the United Kingdom. He has M.Sc. and D.Phil. degrees in economics from York University

**CAROL L. GRAHAM** is College Park professor in the School of Public Policy at the University of Maryland and senior fellow in economic studies and Charles Robinson chair in foreign policy studies at the Brookings Institution. Previously, she was codirector of the Center on Social and Economic Dynamics at the Brookings Institution and research fellow at the Institute for the Study of Labor. She has served as special advisor to the vice president of the Inter-American Development Bank, as a visiting fellow in the office of the chief economist of the World Bank, and as a consultant to the International Monetary Fund and the Harvard Institute for International Development. Her research focuses on public health, poverty, inequality, economics of happiness, and measures of subjective well-being. She has an A.B. degree from Princeton University, an M.A. degree in international economics from the Johns Hopkins School of Advanced International Studies, and a Ph.D. degree in political economy from Oxford University.

**V. JOSEPH HOTZ** is the arts and sciences professor of economics in the Department of Economics at Duke University, research affiliate at the Institute for Research on Poverty at the University of Wisconsin-Madison, research fellow at the Institute for the Study of Labor, and research associate at the National Bureau of Economic Research. He also serves as a research affiliate at the National Poverty Center, the Gerald R. Ford School of Public Policy, and the University of Michigan. Previously, he served as visiting scholar at the Cowles Foundation, Yale University, and at the Russell Sage Foundation and as a professor and chair of the Department of Economics at the University of California, Los Angeles. His areas of specialization include labor economics, population economics, and applied econometrics. He has a B.A. degree from the

University of Notre Dame, and M.S. and Ph.D. degrees in economics from the University of Wisconsin-Madison.

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