

THE DAY RECONSTRUCTION METHOD

Linking Time-Use with Emotional Well-Being

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RESEARCH ON SUBJECTIVE WELL-BEING

- Introduced by psychologists (e.g., Wilson 1967, Argyle, 1987)
- Since late 1990s: increasing number of publications about SWB in Economics (more than 2000 publications about well-being, happiness or life satisfaction since 2000, EconLit)
- Belief that social indicators alone do not define quality of life (Diener and Suh, 1997)
- Viewed as complimentary information on (economic) behavior

SUBJECTIVE WELL-BEING

- SWB is a multi-faceted concept:
 - Global judgements of life
 - Domain satisfaction
 - Emotional responses
- Correlates well with variety of relevant measures
 - Physiological and medical criteria
 - Emotional status
 - Recent changes of life circumstances (income, marriage)
 - ...

EVALUATIVE (REMEMBERED) WELL-BEING

- *"Based on thoughts people have about their life when they think about it"* (Kahneman and Krueger, 2006)
 - Life satisfaction / Happiness
 - "All things considered, how satisfied are you with your life as a whole these days?"*
 - Domain satisfaction
 - How satisfied are you with ... yourself, health, conditions of living place, control over important things ...*
- "Global" concept
- Cognitive evaluation/judgement based on
 - own current life and life in different periods
 - life of others
 - future expectations, aspirations, goals

EXPERIENCED (HEDONIC) WELL-BEING

- *"Based on hedonic experience are measures of pleasures and pain that define experienced-utility"* (Kahneman et al., 1997)
 - Experienced Sampling Method
 - Day Reconstruction Method
- Momentary affective experiences / emotions
- Resembles everyday life
- Utility as the *"the integral of the stream of pleasures and pains associated with events over time"* (Edgeworth, 1881)

WHY IS IT USEFUL?

"How to gain, how to keep, how to recover happiness is in fact for most men at all times the secret motive for all they do"

(James, *The Varieties of Religious Experience*, 1902)

- Burden of different illnesses
- Social and environmental stressors
- Policy evaluation
- Welfare of nations (e.g., Commission on the Measurement of Economic Performance and Social Progress, 2009)
- Consumer research
- ...

MEASUREMENT OF EXPERIENCED WELL-BEING

- Experienced Sampling Method (Csikszentmihalyi and Larsen, 1987):
 - Real-time collection of individual experiences
(GOLD STANDARD)
- Day Reconstruction Method (Kahneman *et al.*, 2004):
 - Combination of time-budget measurement and experience sampling

OVERVIEW

- Day Reconstruction Method (Kahneman *et al.*, 2004)
- Combination of time-use analysis and measurement of affective experiences
- Time-use:
 - Systematic reconstruction of previous day (Event History Calendar, Belli, 1998)
 - Ask individuals what activities they were doing, for how long, with whom ...
- Emotional affects during each reported activity:
 - E.g., *calm, relaxed and enjoying, worried, rushed, irritated or angry, depressed, and tense or stressed*
 - Item scale: 0 "Not at all", ... , 6 "Very much"
 - "Not at all" natural zero point

QUESTIONNAIRE I

| | | | |
|-------|--|---|--|
| Q7050 | What was the next thing you did yesterday morning? | | |
| | <i>INTERVIEWER: If the respondent mentions more than one activity, probe with "Which of these activity were you paying most attention to or required the most effort." Circle only ONE activity.</i> | | |
| | 1 WORKING 2 SUBSISTENCE FARMING 3 PREPARING FOOD 4 DOING HOUSEWORK 5 WATCHING CHILDREN 6 SHOPPING 7 WALKING SOMEWHERE 8 TRAVELING BY BICYCLE 9 TRAVELING BY CAR/BUS/TRAIN | 10 REST (INCLUDES TEA/COFFEE BREAK) 11 CHATTING WITH SOMEONE 12 PLAYING (INCLUDES CARDS/GAMES) 13 READING 14 LISTENING TO RADIO 15 WATCHING TV 16 EXERCISING OR LEISURELY WALK 17 OTHER LEISURELY ACTIVITY | 18 GROOMING OR BATHING (SELF) 19 EATING 20 RELIGIOUS ACTIVITY 21 PROVIDING CARE TO SOMEONE 22 INTIMATE RELATIONS/SEX 23 WENT TO SLEEP FOR THE NIGHT |

| | | |
|-------|---|--|
| Q7051 | How long did this activity last? | <input type="text"/> <input type="text"/> : <input type="text"/> <input type="text"/> HOURS : MINUTES |
| | <i>INTERVIEWER: If respondent has trouble with exact duration, get estimate or approximate.</i> | |
| Q7052 | Were you talking or interacting with anyone when you did this? | 1 ALONE → Q7053 2 SPOUSE 3 ADULT CHILDREN 4 YOUNG CHILDREN OR GRANDCHILDREN 5 FAMILY (OTHER THAN SPOUSE/CHILDREN) 6 FRIENDS 7 CO-WORKERS 87 OTHER, SPECIFY: |
| | Q7052a. At the time, how friendly were you feeling towards this person (these people)? | 1 Very friendly 2 A little friendly 3 A little irritated 4 Very irritated |

Source: WHO Study on AGEing and Health (SAGE)

QUESTIONNAIRE II

Now, please think about how you felt yesterday during that time of the day. Please respond "not at all", "a little", or "very much".

| | | NOT AT ALL | A LITTLE | VERY MUCH |
|-------|--|------------|----------|-----------|
| Q7053 | How <u>worried</u> were you feeling? | 1 | 2 | 3 |
| Q7054 | How <u>rushed</u> were you feeling? | 1 | 2 | 3 |
| Q7055 | How <u>irritated or angry</u> were you feeling? | 1 | 2 | 3 |
| Q7056 | How <u>depressed</u> were you feeling? | 1 | 2 | 3 |
| Q7057 | How <u>tense or stressed</u> were you feeling? | 1 | 2 | 3 |
| Q7058 | How <u>calm or relaxed</u> were you feeling? | 1 | 2 | 3 |
| Q7059 | How much were you <u>enjoying</u> what you were doing? | 1 | 2 | 3 |

Source: WHO Study on AGEing and Health (SAGE)

NET AFFECT

- *"Utility as the stream of pleasures and pains associated with events over time"* (Edgeworth, 1881)

$$U_i = \sum_a \frac{t_{ia}}{T_i} u_{ia}$$

$$u_{ia} = \sum_l \frac{t_{ia}^l}{T_i} PA_{ia}^l - \sum_k \frac{t_{ia}^k}{T_i} NA_{ia}^k \quad \forall a = 1, \dots, 5$$

- $\frac{t_{ia}}{T_i}$ fraction of time spent in activity a ,
- PA_{ia}^l l -th positive emotion during activity a
- NA_{ia}^k k -th negative emotion during activity a
- Assumes cardinality, subject to potential scale effects

U-INDEX

- Proportion of time in which the highest-rated emotion is negative (misery index)

$$UI_i = \sum_a \frac{t_{ia}}{T_i} UI_{ia}$$

$$UI_{ia} = \begin{cases} 1 & \text{if } \max\{NA_{ia}^1, \dots, NA_{ia}^K\} > \max\{PA_{ia}^1, \dots, PA_{ia}^K\} \\ 0 & \text{otherwise} \end{cases}$$

- Relies on ordinal ranking of feelings, independent of scale effects
- Dichotomous categorization: loss of information

PROS & CONS

?

PROS & CONS

- + Does not depend on cognitive evaluation, imperfect recall and duration neglect
- + Easier to implement than ESM, high correlation (Kahneman *et al.*, 2004, Dockray *et al.*, 2010)
- + Abbreviated versions of DRM show similar results (Miret *et al.*, 2012)
- + View on everyday life (full day)
- + Provides data on time-use
- + Moderately high test-retest reliability (correlation 0.45 - 0.65, Krueger and Schkade, 2008)

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- + Moderately high test-retest reliability (correlation 0.45 - 0.65, Krueger and Schkade, 2008)
- Random day, does not capture infrequent activities
- "Expensive" implementation into surveys
- Selection into activities depending on preferences and endowments
- Declining marginal utility of time spent in various activities (Correlation)

APPLICATION

Disability and Subjective Well-being – Disentangling the effect of time-use and emotional affects

(jointly with Jürgen Maurer and Gabriela Flores)

■ Research Question:

- Compare *everyday life* of older persons with and without disabilities in low and middle income countries
- Decompose effect of disability on experienced well-being into *Saddening Effect* and *Time Composition Effect*

SAMPLE

- WHO Study on AGEing and Health (SAGE)
- Multi-country Survey: 2 upper-middle (Russia, South Africa), 2 lower-middle (China, India), and 1 low income country (Ghana)
- Country-specific analysis (*no comparative analysis*)
- Individuals aged 50+
- Information about demographics, household composition, SES, health, (...), and SWB

| | Pooled | Ghana | India | China | South Africa | Russia |
|--------------|--------|-------|-------|-------|--------------|--------|
| Age | 62.7 | 64.3 | 61.4 | 62.5 | 61.5 | 63.9 |
| Male | 48.0 | 52.3 | 50.9 | 50.1 | 38.9 | 43.9 |
| Observations | 22126 | 3087 | 4849 | 9407 | 2057 | 2726 |

The entries in each column are country-specific averages using population weights.

COUNTERFACTUAL EXERCISE

- Net Affect:

$$U_i = \sum_a \frac{t_{ia}}{\bar{T}_i} u_{ia}$$

- Decompose effect of disability into (\sim Knabe *et al.*, 2010)

SADDENING EFFECT:

Suppose disabled and able-bodied have same time allocation but different affect ratings

$$\Delta_U^{Affect} = \sum_a \frac{\bar{t}_a}{\bar{T}} \times \beta_a^u$$

TIME COMPOSITION EFFECT:

Suppose disabled and able-bodied have same affect rating but different time allocations

$$\Delta_U^{Time} = \sum_a \bar{u}_a \times \beta_a^t$$

DISABILITY AND EXPERIENCED WELL-BEING

- *Net Affect*: OLS

$$U_i = \alpha + \beta \text{Disabled}_i + X_i \gamma + \epsilon_i \quad (1)$$

- *Activity-Specific Net Affects*: SURE

$$u_{ia} = \alpha_a^u + \beta_a^u \text{Disabled}_i + X_i \gamma_a^u + \epsilon_{ia}^u \quad \forall a = 1, \dots, 5 \quad (2)$$

- *Time-Shares*: Multivariate Fractional Regression (Mullahy, 2010)

$$\xi[t_a | X_i] = \frac{\exp(\alpha_a^t + \beta_a^t \text{Disabled}_i + X_i \gamma_a^t)}{1 + \sum_{m=1}^4 \exp(\alpha_m^t + \beta_m^t \text{Disabled}_i + X_i \gamma_m^t)} \quad \forall a = 1, \dots, 4 \quad (3)$$

$$\xi[t_5 | X_i] = \frac{1}{1 + \sum_{m=1}^4 \exp(\alpha_m^t + \beta_m^t \text{Disabled}_i + X_i \gamma_m^t)} \quad (4)$$

REGRESSION RESULTS

| | Ghana | India | China | South Africa | Russia |
|--|-----------|-----------|-----------|--------------|-----------|
| Panel A. Net Affect (std.) | | | | | |
| Disabled | -0.108* | -0.355*** | -0.158*** | -0.459*** | -0.284*** |
| Panel B. Activity-Specific Net Affects (std.) | | | | | |
| Work | -0.033 | -0.328*** | -0.174*** | -0.888*** | -0.365** |
| Housework | -0.181** | -0.386*** | -0.167*** | -0.342*** | -0.285** |
| Travel | -0.052 | -0.311*** | -0.303*** | -0.342** | -0.454** |
| Leisure | -0.149** | -0.327*** | -0.142*** | -0.374*** | -0.234** |
| Self-care | -0.067 | -0.284*** | -0.181*** | -0.355*** | -0.376*** |
| Panel C. Time Allocation | | | | | |
| Work | -0.027** | -0.043*** | -0.049*** | -0.058*** | -0.105*** |
| Housework | -0.043*** | -0.002 | -0.019*** | -0.017 | 0.011 |
| Travel | -0.024*** | -0.016*** | -0.001 | -0.021*** | -0.032** |
| Leisure | 0.105*** | 0.034** | 0.068*** | 0.085*** | 0.109*** |
| Self-care | -0.012 | 0.027*** | 0.001 | 0.011 | 0.017 |

* ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$)

DECOMPOSITION RESULTS

| | Ghana | India | China | South Africa | Russia |
|-------------------------|----------|-----------|-----------|--------------|-----------|
| Difference | -0.087** | -0.367*** | -0.215*** | -0.289*** | -0.317*** |
| Saddening Effect | -0.088** | -0.333*** | -0.206*** | -0.297*** | -0.339*** |
| Time Composition Effect | 0.028*** | 0.023*** | 0.029*** | 0.020*** | 0.062*** |

Panel A. Saddening Effect

| | | | | | |
|-----------|----------|-----------|-----------|-----------|-----------|
| Work | -0.005 | -0.043*** | -0.039*** | -0.042*** | -0.081*** |
| Housework | -0.016** | -0.072*** | -0.047*** | -0.054*** | -0.101*** |
| Travel | -0.003 | -0.018*** | -0.009*** | -0.020*** | -0.018*** |
| Leisure | -0.054** | -0.139*** | -0.087*** | -0.119*** | -0.115*** |
| Self-care | -0.011 | -0.062*** | -0.025*** | -0.062*** | -0.025*** |

Panel B. Time Composition Effect

| | | | | | |
|-----------|----------|----------|----------|----------|----------|
| Work | 0.005** | 0.008*** | 0.016*** | 0.000 | 0.033*** |
| Housework | 0.002 | 0.001* | 0.003** | -0.002* | 0.001 |
| Travel | 0.004*** | -0.001* | -0.000 | -0.000 | 0.002 |
| Leisure | 0.019*** | 0.008*** | 0.010*** | 0.019*** | 0.025*** |
| Self-care | -0.002 | 0.007*** | 0.000 | 0.003 | 0.002 |

* ($p < 0.10$), ** ($p < 0.05$), *** ($p < 0.01$)

Note: The entries in each column are country-specific differences in net affect between individuals with and without disability. Standard errors are computed using 100 bootstrap replications

FINDINGS

- Disability and experienced well-being
- Disabled persons report
 - lower Net Affects
 - lower affect ratings during each activity
 - shift time from work-related to leisure/self-care activities
- Counterfactual exercise
 - Differences in Net Affects mainly through *Saddening Effect*
 - Partially mediating effects of changes in *Time Composition*

CONCLUSIONS

- Data on experienced well-being valuable tool
 - **Complementary** information on individual well-being
 - Combination of time-use and emotional well-being provides new insights (everyday life)
- Offers direct measure of well-being
 - Does not rely on standard economic assumptions (rationality)
- Experienced well-being related to individuals' health outcome etc.
- In line with Edgeworth's definition of utility

LIMITATIONS

- Experienced well-being only partial (momentary) view on individual well-being
- Expensive to implement
 - ~ 45-75 minutes interviewing time for full day DRM
 - So far mostly cross-sectional evidence
- Reliability still not extensively tested
- Well-being may depend on other factors than moment-to-moment experiences (autonomy, achievements, freedom, relationships)
- Life may be seen as a stock of good and bad memories, rather than a flow

**THANK YOU FOR YOUR
ATTENTION!**

DISABILITY

- Classify relevant health information into one of the three domains following ICF (~ WHODAS 2.0)
 - *Impairments*: e.g., vision, cognitive functioning and/or bodily pain, and emotionally affected by own health
 - *Activity Limitations*: e.g., ADL, functioning/mobility
 - *Participation Restrictions*: e.g., community involvement, friendships, taking care of hh responsibilities
- Single items: *During the last 30 days, how much difficulties ...* : 1 "None" to 5 "Extreme/Cannot do"
- Domain-specific disability scores = sum of all items
- **Disabled** \equiv Top 30% of the distribution in at least one of the domains