Workshop

"The Scientific Assessment of Biomeasures in the Panel Study of Income Dynamics"
Ann Arbor, Dec 11-12, 2008

International Experiences

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Big Issues

- Rationale for inclusion
- Comparability/ harmonization
- What and how to collect?
- Biomeasures in context of wider innovation
- International experiences

Rationales for inclusion

- Goals & hypotheses
- Integrating biology and behaviour
- Pathways and feedbacks
  - Intermediate phenotypes
- Niche product for household panels:
  - Full age range
  - Family contexts
  - Shared and non-shared genes

The 3 P's

- **Pathways** within person
  - Genes
  - Brain, Mind, and endocrine system
- **Processes** (Person with 'environment')
  - Mediating elements
  - Interplays, 'Packages' & sequences
  - Other People and Context/ Structures
- **Progression** through life-course
  - How lives develop over time
  - **Interplay of Pathways & Processes**

Integrating Biology & Behaviour

- Prospective studies essential
- Need to develop mid-level theory or frameworks
- Understanding vs description & causation
- Individuals as focus of analysis, but both in context and ‘under the skin’
- How does biology get ‘outside the skin’?
- How does environment get ‘under the skin’?

Behavioural economics

- Rationality and choice
- Decision-making heuristics or intuitive judgements
  - 'Fast and frugal' (Gigerenzer)
  - Frontal lobes vs amygdala? - 'Hot' & 'Cold' cognition
- Prospect theory, loss-aversion and asymmetric information
  - migration, marriage, becoming a parent
- Intertemporal choice – Delayed gratification
  - Special role for immediate gratification
    - Different part of brain (McClure *et al*)
  - Individual differences in discount rates
  - Implications for 'risky demographic, economic & health behaviours'
- Trust
  - Economic, partnership & parenting behaviours
    - Links to oxytocin, vasopressin, dopamine pathways

Progression through Life-Course

- Pathways and Processes interplay over time
- Gene, Brain, Mind, Person, Other Persons, and Structures all interplay
- Multiple dynamic process
- Complex feedbacks and interactions
- Sequences, precursors, triggers, packages
- Endowments and experiences shape person who reacts and behaves

What causes persistence of effects?

- Epigenetic pathways (environment switches gene expression on or off)
- Neuroendocrine responses – lasting synaptic changes in brain, both cognitive and affective
- Feedbacks in self-esteem, personality traits, bonding
- Key developmental stages?
- How to identify, measure and theorise?

Becoming transdisciplinary

- Major reorientation of social science research
- Build on best features of
  - Psychology and Health sciences
- Study of development across life-course
  - Careers, relationships, cognition, personality, health
- Interlinking Alleles, Brains, and Contexts
- Emphasis on mutual feedbacks and interplays

Birth Cohorts UK

- 1946 – strongly BM, nurse visits, clinic
- 1958 – BM sweep at age 45, nurse visit
- 1970 – planned BM sweep at age 45
- ALSPAC 1991/2 – strongly BM
- MCS 2001 – some BM: teeth, accelerometer, anthropometry - interviewers
- 2012 – planned to have integrated BM throughout

Other key birth cohorts

- Dunedin (NZ) 1972– strongly psychological, hugely influential on G×E
- Christchurch (NZ) 1977 – less BM
- Fragile Families: BM included at age 9
- Several new birth cohorts:
  - NCS (US), ELFE (France), Ireland, Norway, Denmark, Netherlands, etc

Other age cohorts

- US tradition of beginning at around age 14
  - AddHealth: BM at last & current wave
  - NLS cohorts: BM being discussed
  - WLS (now ageing issues): BM in recent wave
- Ageing studies – all now have a clear biomedical focus
  - HRS (US) (also MIDUS)
  - ELSA (UK) – nurse visits
  - SHARE (Europe and elsewhere)
  - UK Biobank – weak on panel and social aspects

Panel Studies

- PSID (US), SOEP (Germany), BHPS (UK), HILDA (Australia), SLID (Canada), SHP (Switzerland)
- ECHP (EU) – short-lived harmonized household panel study, no BM component
- GGP (UNECE)– harmonized individual panel, 3-year intervals – exploring BM possibilities but low key
- NKPS – innovative kinship panel study, no BM

Household Panels & BM -1

- **Prospective**: PSID, SOEP, & BHPS all long-running
  - But BM not retrospectively measurable
  - Special role for DNA as stable (but epigenetics)
- **Full age-range**
  - Presents some problems of sample sizes
  - Need to differentiate from ageing studies
  - Find niche for full age range e.g. behaviours

All household members

- Follow beyond household
- Family contexts
- Shared and non-shared genes
- Shared and non-shared environments
- **Huge importance: genes & siblings** not just methodological tricks (FE or IV) but of **substantive interest**
- Pulling apart G×E from rGE and distinguishing passive, active, and evocative rGE
- Key to exploring interplays among the 3 P's

Annual Interviews

- Enable better monitoring of change and life stressors
- Provide opportunities for rotating content
- Short BM and stable characteristic components each wave
- Build up into integrative picture

Innovation

- BHPS and SOEP exploring trust measures and linking to experiments
  - Many other possibilities for linking to behavioral and experimental economics and neuroscientific measures
  - SOEP exploring risk aversion and discount rates in pilot experiments
- SOEP and BHPS included Big 5 personality traits in 2005
  - An example of a relatively stable characteristic
- SOEP and BHPS also include cognitive measures, another relatively stable attribute
- Multiple informants to improve measurement

New Household Panels

- Understanding Society: UKHLS
  - 40K households
  - 100K individuals
  - Innovation Panel – piloting & methodological
  - Integrates BHPS
  - Ethnic minority boost of 3K households
  - Links to administrative data
  - Plans for strong biomedical component
- MESS/ LISS – Netherlands
  - 5K Households
  - Web based

Proposed UKHLS strategy

- Two core elements proposed:
- **Biomarkers** collected by minimally invasive methods
- **'Stable' characteristics** as potential key pathways
- 5/10 minutes (nominal) for each
- Changing annual content
- Accumulation over time

Biomarkers

- Minimally-invasive approaches - robust
- Use trained survey interviewers
  - BUT strong UK tradition of nurse interviews
- Some priority if relevant to social sciences

- Saliva for DNA and genotyping
  - Special role of neurotransmitter/ brain pathway markers
- Dried bloodspots for assay
- Anthropometry
- Physical functioning
- *(Speculatively)* body fluids for NMR metabonomics

Biomarker Criteria

- High prevalence in the general population;
- Relevant across a broad age-range;
- Capable of minimally-invasive measurement
- At most a few minutes of respondent time;
- Relevant to a broad range of studies
- Preference for those that can inform research across a range of disciplines or domains;
- At least one clear hypothesis for which the biomarker is critical, as outcome or pathway.

‘Stable’ characteristics

- Mediate or moderate links from biomarkers to behaviours/ outcomes or other key pathways
- Often linked to brain & thus behaviour

- Cognitive ability/ functioning
- Personality traits
- Cognitive styles
  - decisiveness, impulse control, trust, etc
- Mental ‘schemas’ or heuristics
  - Family or economic behaviours
- Motivation, self-esteem, reciprocity, etc

Stable Characteristic Criteria

- Relatively stable over time
- Important if they show significant change
- Matter across a broad age range
- Play a key role in understanding pathways to behaviours or outcomes
- Interplay (e.g. across domains) in pathways from one to another or in shaping yet other outcomes

Measurement

- Innovative approaches
- Appropriate to the stable measure

- Traditional questions
- Vignettes (e.g. family situations)
- Games or experiments (from behavioural economics)
- CASI (e.g. implicit association tests on prejudice)

Enabling Research

- Combination rich set biomarkers & stable
- Gene-environment interplays
- Pathways through stable characteristics to
  - social, demographic, economic, health and psychological outcomes and behaviours
- Illuminating interplays among these disciplinary domains

Way forward

- Three to five year package
- Integrated biomarkers and stable characteristics
- Build up over several years
- Investing in capability: training & networks

Conclusion

- Neither exclusively social surveys or exclusively biomedical surveys are adequate for furthering real understanding
- Too much evidence for 'nurture via nurture'
- Must have **integrated biosocial surveys** that cover multiple domains:
  - Genes, other biomarkers, brain/ personality measures, life experiences, and contexts