Next Phenotypes for the Consortium

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Criteria for an Ideal Phenotype

1. Interesting to researchers in the relevant domain.
2. Widely-measured in GWAS cohorts.
3. Measured consistently and reliably across cohorts.
4. Biologically proximate.

Next Initiatives

- We would like to promote meta-GWAS analyses of social science phenotypes.
- Each new initiative will require:
  - One or more project leaders.
  - One or more lead analysts.
- While we have the capacity to lead several, and we have several excellent analysts, we also need volunteers!
- SSGAC will be as supportive as possible, providing:
  - A full list of GWAS cohorts we know of that have the phenotype.
  - Help and advice, as requested.
  - As a CHARGE working group, each initiative will have access to resources (e.g., conference calling facilities).
- This session: (1) List potential phenotypes to pursue and, (2) in order not to overburden cohorts, prioritize phenotypes.

Overview of Widely-Available Phenotypes

- Subjective well-being
- Income / Socioeconomic Status
- Number of Children
- Marital status

- We do not want to compete with existing projects, so please let us know if you know of similar, ongoing work.
- Please let us know if you have any other ideas we should look into.
- Please let us know if you are interested in being involved in these or others!

Subjective Well-Being

- Subjective well-being (SWB) is an increasingly major research topic in psychology and economics.
  - Much broader than depression; focused on the range of normal variation.
  - There is much evidence that SWB affects immune function and health status (Marsland, Pressman, & Cohen, 2007).
  - Twin studies suggest ~50% heritable (e.g., Lykken & Tellegen, 1996; Bartels & Boomsma, 2009).
  - Already several existing candidate gene studies (De Neve, 2011; De Neve, Fowler, Frey, & Christakis, 2011) and a GWAS (Bartels et al., 2010).
- Measured in at least 16 SSGAC cohorts.
- Harmonization of different measures:
  - Simple solution: standardize and pool.
  - More sophisticated: conduct a study to map between measures.

Examples of SWB Measures

SALTY:

"Would you, in general, describe yourself as:

- Very happy
- Rather happy
- Not very happy
- Not at all happy"

Health and Retirement Study:

"During the past 30 days, to what degree did you feel happy?

- Very much
- Quite a bit
- Moderately
- A little
- Not at all"

Income / Socioeconomic Status

- Income and socioeconomic status (SES) are major research topics in economics and sociology.
  - SES typically combines occupation/income and education.
  - Twin and other study designs suggest income is ~40% heritable (e.g., Taubman, 1976; Björklund, Jäntti & Solon, 2005).
  - Higher income and more education both seem to be causally related to better health (Deaton & Paxton, 2001).
- Occupation is measured in at least 24 SSGAC cohorts; virtually all of these also measure education.
  - A standard approach is to convert occupation to income using government records of mean income by occupational code.

Examples of Income/Occ. Measures

Women's Health Initiative:

"What was the total family income (before taxes) from all sources within your household in the last year?

- ☐ Less than $10,000
- ☐ $10,000 to $19,999
- ☐ $20,000 to $34,999

…

- ☐ $100,000 to $149,999
- ☐ $150,000 or more"

AGES-RS:

"What type of occupation did you work at for the longest period of your working life and for how many years? _____"

Partial and Preliminary Research Team

Income / Socioeconomic Status:

- Nick Martin
- Sarah Medland
- Aldo Rustichini
- Dalton Conley

Number of Children

- Fertility is a major topic in biology and across the science sciences.
  - Fertility is up to 50% heritable (Kohler, Rodgers, Christensen, 1999).
- Number of children is measured in at least 12 SSGAC cohorts.
- Typical question is simply, “How many children do you have?”
  - Many also ask for age of children.
  - Age at first pregnancy can be calculated from age of respondent and ages of children.
  - Age at first pregnancy has heritability ~40% (Christensen, Kohler, Basso, Olsen, Vaupel, & Rodgers, 2002).
- Existing CHARGE “ReproGEN” working group.

Preliminary List of Interested Researchers

Fertility:

- Melinda Mills
- Nicola Barban
- Harold Snieder

Marital status

- Marital/relationship history is also a major topic in biology and across the social sciences.
  - Ever-married status is ~70% heritable (e.g., Johnson, McGue, Krueger, & Bouchard, 2004).
  - Long known that being married is associated with better health and lower mortality risk (Lillard & Panis, 1996).
- Marital status is measured in at least 22 SSGAC cohorts.
- Example question (from ARIC): “Please tell me which of the following describes your current marital status:

□ Married

□ Widowed

□ Divorced

□ Separated

□ Never married”

Partial and Preliminary Research Team

Marital Status:

- Melinda Mills
- Nicola Barban
- Harold Snieder
- Dalton Conley

Recap: Widely-Available Phenotypes

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- Suggestions? Priorities?