*Brief report on the discussion: '**From association to causation**'*
by Camelia Minica and Meike Bartels

First of all, we wish to thank to all the participants to the discussion '***From association to causation***' following the presentation '***Focus on majority: including happiness in public health research***' by Prof. Meike Bartels on Friday the 25th of November 2016 at the Amsterdam Public Health Kickoff Annual Meeting. The aims of the discussion were:

(a) to share some of the thoughts on following-up the wealth of genome-wide association analyses results by shifting focus from testing genetic association to addressing causal questions using ***Mendelian Randomization*** (i.e., the 'nature's Randomized Controlled Trial', a method which involves using genetic variants to test causal hypotheses in observational studies), and

(b) to try to prioritize some of the causal questions and research directions that could be addressed by using Mendelian Randomization.

Below you will find a synthesis of the input provided by the participants (based on the answers and votes corresponding to the two questions addressed during the discussion).

QUESTION 1: What causal questions do you consider should be at the top of APH agenda?

The participants proposed a large variety of causal questions regarding risk factors/outcomes pertaining to health behaviors, mental health, societal participation, aging, quality of care, quality of life, health, lifestyle. A few of the most frequently mentioned causal questions included in these categories were:
- **EXERCISE/PHYSICAL ACTIVITY**: exercise - depression, exercise - wellbeing, exercise - happiness, exercise - disease, exercise - BMI, exercise - quality of life, exercise - nutrition, exercise - work ability, exercise - cardiovascular disease morbidity, exercise - mental health, physical activity - injury, sedentary behavior - cardiovascular disease, active lifestyle – mental health, physical activity - work.
- **FERTILITY**: smoking - fertility, cancer- fertility, education - fertility, BMI- fertility, height - fertility, alcohol - fertility, happiness - fertility.
-**OCCUPATIONAL PARTICIPATION/WORK**: occupational participation - mortality, unemployment - health, health - retirement, shiftwork - cardiovascular disease, chronic disease - work, low vision – participation, physical activity - work ability.
- **WELLBEING**: wellbeing - loneliness, brain structure - wellbeing, wellbeing – depression, wellbeing - self-control, wellbeing - life expectancy, wellbeing - brain function.
- **DEPRESSION**: exposome - depression, brain structure - depression, nutrition - depression, CBT - depression, lifestyle-depression, cancer – depression, pain - depression, hearing loss - depression, family support - depression, physical activity – depression, depression – illness, stress – depression, aggression – depression.
- **QUALITY OF LIFE (QoL)**: QoL - chronic illness, exercise - QoL, medication review - QoL, use of care services – QoL.
- **CARDIOVASCULAR DISEASE** (CVD): sedentary behavior - CVD, shiftwork - CVD, physical activity - CVD morbidity, alcohol - CVD.
- **SMOKING**: smoking - stress, smoking - brain development, smoking - hospitalization, smoking - BMI, smoking - stress, smoking - happiness, 2nd hand smoking - brain development, smoking - sleep quality.
- **ALCOHOL**: alcohol – depression, alcohol – cardiovascular disease.
- **NUTRITION**: nutrition - mental health, nutrition - depression, nutrition - IBD, exercise - nutrition
- **AGING**: aging - mosaicism, WIFI - aging.

- **CANCER**: cancer - fertility, cancer - depression, cancer screening – free choice, physical activity - cancer morbidity.
- **LIFESTYLE**: lifestyle - dementia, lifestyle - depression, active lifestyle - mental health.
- **ADHD**: ADHD - academic skills, ADHD - conduct disorder
- **SOCIO-ECONOMIC STATUS** (**SES**): SES - psychosocial problems, aggression - SES, height - SES, SES - cause of death.
- **AGRESSION**: aggression - socio-economic status, aggression - addiction, aggression - PTSD, aggression - anxiety, self-control – aggression, behavioral problems - education.
- **HAPPINESS**: smoking - happiness, BMI - happiness, exercise - happiness, happiness - fertility, happiness - decision making, religiousness – happiness.

The complete Word-Cloud can be accessed here. The font size is determined by the frequency of the answers (i.e., the more frequent answers are displayed in larger font size). However, the font size does not scale proportionally with frequency.

For many of these risk factors there are genetic instruments available and so their causal effect on various outcomes can be assessed using Mendelian Randomization.
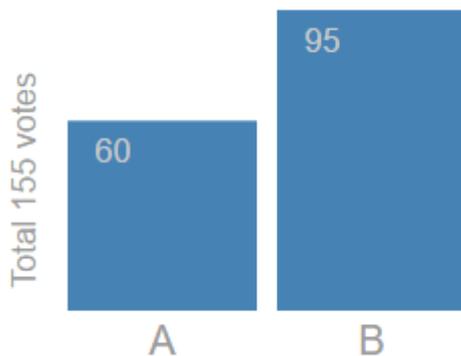
QUESTION 2:
What research direction would you prioritize if you were to choose between allocating research funds to:
A. Elucidate causal questions about diseases (focus on minority)
OR
B. Elucidate causal questions about healthy behaviours (e.g., well-being, physical exercise) (focus on majority)
Below is a graphical representation of the results:

Figure 2: Bar plot representing the number of votes expressed for each of the 2 answer options: A – focus on causal questions about disease, and B – focus on causal questions about healthy behaviors.

In total, there were 155 votes. The majority of the respondents (> 61%) voted for focusing research on elucidating causal questions about healthy behaviors (option B, indicating a preferential focus on majority), while 38.7% of the participants voted for option A (indicating a preferential focus on causal questions about disease).

We thank you again for your participation,
Camelia Minica and Meike Bartels