

PSY2209 home exam – autumn 2024

Effect of the ban of unhealthy food advertisement on polygenic prediction of body mass index (BMI)

Recently, Norwegian parlement and government proposed to ban unhealthy food advertisement to children. **What effect could this ban have on BMI of children, and would it affect how much variance of BMI is explained by genetic variants?**

In this exercise, you are a scientist in 2031. The ban was indeed introduced in 2025, and you decide to study its effects. You have access to measures of BMI of children at age 6. BMI was measured in 6 years-old children in several birthyear cohorts, such that some children turned 6 before the ban introduction (2020-2024) and some turned 6 after the ban introduction (2026-2030). All children were genotyped.

Answer the research question for this (simulated) data. Use PRSice and Rstudio.

You will need the following files:

- PLINK binary files containing individual-level genetic data (genotypes_qc)
- BMI GWAS summary statistics (BMI.txt)
- A phenotype file containing measure of BMI at age 6 (column name “BMI”) and if the child turned 6 before or after the ban (column name “condition”) (pheno.txt)

Once you’ve completed the analyses, write up a report featuring:

- introduction (background on polygenic scores and prediction of BMI)
- methods (including detail on how the polygenic score was made)
- results (details on the variables and model results)
- discussion (including discussion of pathways linking the polygenic score with BMI, type of conceptual GxE models, strengths and limitations of polygenic prediction)

The report should be maximum 4 pages in length and should be written with 1.5 line spacing and size 12 font.