

# **“Prediction of individual genetic risk of disease: attacking a straw man?”**

**Peter M. Visscher**

Queensland Statistical Genetics

Queensland Institute of Medical Research Brisbane, Australia

## **Abstract:**

Genome-wide association studies (GWAS) for complex traits have been an overwhelming success. Many validated associations have been discovered, identifying previously unsuspected pathways. GWAS have provided direct empirical evidence for the genetic architecture of diseases, which has long been a topic of hot debate. However, despite this success, individual genetic variants have small effect size, odds ratios of  $\sim 1.1$  are the norm and are by themselves not useful for risk prediction. We propose to use multiple loci to predict risk for an individual, using methods that focus on estimation/prediction rather than on hypothesis testing. We explore the power and limitations of risk prediction using theory, simulation studies and empirical applications. We demonstrate how the application of a risk prediction framework has led to new insights in the genetic basis of schizophrenia and bipolar disorder.