



Increasing GWAS sample size using Item Response Theory: A pilot study of the Personality Consortium



Marleen de Moor, Stéphanie van den Berg, Jasper Wouda, Karin Verweij, Narelle Hansell, Nicholas Martin, Dorret Boomsma

Background

- Twin and adoption studies show that personality traits are heritable.
- Genome-wide association (GWA) studies have suggested some loci, but effect sizes are very small and replication has proven difficult.

Aim

Combine data from multiple (GWA) samples using multiple personality instruments, to increase chances to find the genetic variants associated with personality

Participating samples

Total sample size with personality data: **~131,000**

Expected sample size with personality and GWA data: **~66,000**

Country	Sample	Sample size	Scale
NL	NTR	30,598	NEO-FFI/ABV
	NESDA	2,981	NEO-FFI
	ERF*	3,000	NEO-FFI
	Nijmegen	1,832	EPQ-R
AUS	QIMR	27,065	NEO-PI-R/(J)EPQ/TPQ
USA	BLSA	1,917	NEO-PI-R
	SAGE*	2,223/649	NEO-PI-R
	Cogend	2,712	NEO-FFI
	Minnesota	2,232/4,511/4,884	MPQ
SE	Karolinska	36,535	EPQ-N/E
FI	Finnish Twins	2,644	NEO-FFI/EPQ
	Young Finns	2,058	NEO-FFI
EE	EGPUT	1,731	NEO-PI-3/IPIP
UK	LBC1921-1936	478+105	NEO-FFI/IPIP
	ORCADES	602	EPQ-R
DE	Munich	476	NEO-PI-/TCI/MMPI2
IT	Cilento	800	NEO-PI-R
CR	VIS/KORCULA	918+810	EPQ-R

* Data are expected

Proposed methods

- Item Response Theory analysis of Neuroticism, Extraversion, and possibly a 3rd higher order personality factor
- GWA analysis of latent constructs (θ 's) in each sample
- Meta-analysis of all GWA results

Pilot study

Samples: NTR and QIMR

Measures: Neuroticism assessed with NEO and EPQ/ABV

Statistical analyses: Measurement invariance analysis and Item Response Theory

Results:

- Neuroticism assessed with NEO and with EPQ is unidimensional
- Neuroticism scales from the NEO and EPQ to a large extent measure the same construct.
- Neuroticism scale of the NEO is measurement invariant across countries.

Conclusions and future plans

Based on the results of the pilot study, mapping scales from different personality questionnaires to the same construct seems feasible.

Increased sample size and increased precision in measurement of the phenotype are expected to lead to find variants associated with personality.



This research is funded by:

VU University, Department of Biological Psychology, mhm.de.moor@psy.vu.nl