

Supplementary table 1. Overview of included cohorts

Cohort	Country	Sample size	Diagnoses (n)	Diagnostic criteria	Psychiatric symptom measures
Amsterdam Dementia Cohort (ADC)	Netherlands	2,131	AD (n=1,582), DLB (n=232), FTD (n=317)	NINCDS-ADRDA & NIA-AA for AD; McKeith 2017 criteria for DLB; Neary 1998 & Rascosky for FTD 2011	NPI-12, GDS
GR@ACE (Genome Research at Ace Alzheimer Center Barcelona)	Spain	4,365	AD (n=4,096), DLB (n=158), FTD (n=111)	DSM-IV, NIA-AA, and McKhann 1984 for AD; McKeith 2017 criteria for DLB; Neary 1998 for FTD	NPI-Q, GDS
the DZNE-Longitudinal Cognitive Impairment and Dementia (DELCODE)	Germany	111	AD (n=111)	NIA-AA for AD	NPI-12, GDS
the Ageing, Cognition and Dementia in Primary Care Patients (AgeCoDe)	Germany	275	AD (n=275)	NINCDS-ADRDA for AD	GDS
Dementia Competence Network (DCN)	Germany	176	AD (n=176)	NINCDS-ADRDA	NPI-12

Abbreviations: Alzheimer’s disease (AD), dementia with Lewy bodies (DLB), and frontotemporal dementia (FTD), the National Institute of Neurological and Communicative Disorders and Stroke–Alzheimer’s disease and Related Disorders Association (NINCDS-ADRDA) and on the National Institute of Aging–Alzheimer association (NIA-AA)

Supplementary table 2. Associations between psychiatric polygenic risk scores (PRS) and Neuropsychiatric Inventory scores across dementia subtypes among four cohorts (ADC, GR@ACE, DELCODE, and DCN)

The Neuropsychiatric Inventory score was log-transformed and calculated as sum of frequency*severity across 12 domains; ADC=Amsterdam Dementia Cohort; GR@ACE=Genome Research at Ace Alzheimer Center Barcelona; DELCODE=the DZNE-Longitudinal Cognitive Impairment and Dementia; DCN= Dementia Competence Network; MDD-PRS=PRS for major depressive disorder; BD-PRS=PRS for bipolar disorder type I, SCZ-PRS=PRS for schizophrenia; ASD-PRS=PRS for autism spectrum disorder; SE=Standard Error; p_{fdr}=false discovery rate adjusted p-values

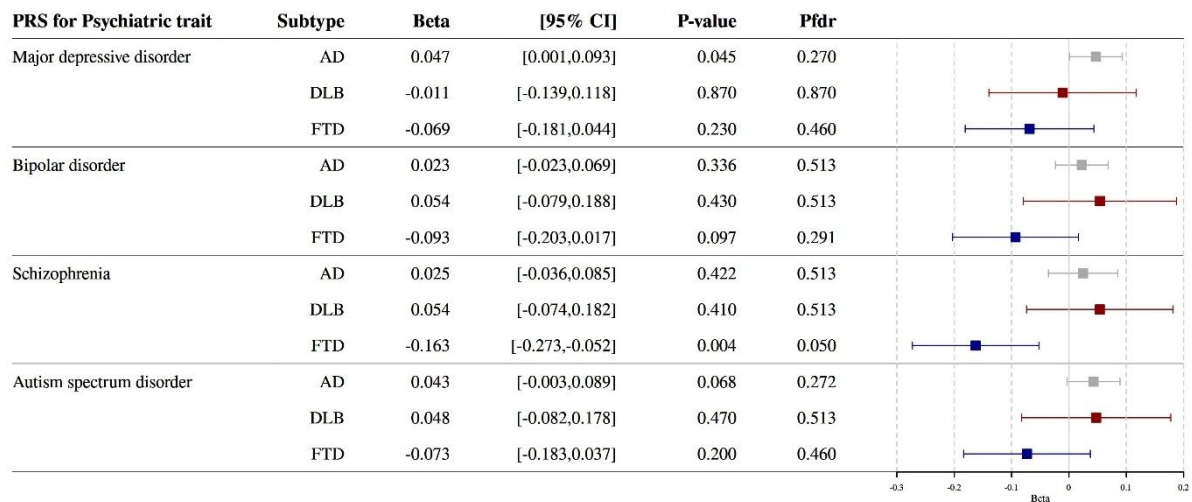
Trait	PRS	Dementia	Beta	SE	P	p _{fdr}	Cohort	N
17 NPI	MDD-PRS	AD	0.0519	0.0274	0.0580	0.4640	ADC	1574
18 NPI	BD-PRS	AD	0.0281	0.0271	0.3000	0.5333	ADC	1574
19 NPI	SCZ-PRS	AD	0.0426	0.0273	0.1200	0.4800	ADC	1574
20 NPI	ASD-PRS	AD	0.0389	0.0273	0.1500	0.4800	ADC	1574
21 NPI	MDD-PRS	AD	0.0306	0.0161	0.0570	0.4640	GR@ACE	4096
22 NPI	BD-PRS	AD	-0.0006	0.0161	0.9700	0.9700	GR@ACE	4096
23 NPI	SCZ-PRS	AD	0.0214	0.0162	0.1900	0.5067	GR@ACE	4096
24 NPI	ASD-PRS	AD	-0.0062	0.0161	0.7000	0.8000	GR@ACE	4096
25 NPI	MDD-PRS	AD	-0.0045	0.0844	0.9600	0.9700	DELCODE	111
26 NPI	BD-PRS	AD	-0.0646	0.0880	0.4600	0.6691	DELCODE	111
27 NPI	SCZ-PRS	AD	-0.0930	0.0869	0.2900	0.5333	DELCODE	111
28 NPI	ASD-PRS	AD	0.0330	0.0846	0.7000	0.8000	DELCODE	111
29 NPI	MDD-PRS	AD	0.1066	0.0986	0.2800	0.5333	DCN	176
30 NPI	BD-PRS	AD	0.0863	0.1013	0.4000	0.6400	DCN	176
31 NPI	SCZ-PRS	AD	0.0589	0.1011	0.5600	0.7467	DCN	176
32 NPI	ASD-PRS	AD	0.1583	0.1000	0.1200	0.4800	DCN	176
33 NPI	MDD-PRS	DLB	-0.0102	0.0614	0.8700	0.8700	ADC	232
34 NPI	BD-PRS	DLB	0.0507	0.0638	0.4300	0.7520	ADC	232
35 NPI	SCZ-PRS	DLB	0.0505	0.0610	0.4100	0.7520	ADC	232
36 NPI	ASD-PRS	DLB	0.0447	0.0621	0.4700	0.7520	ADC	232
37 NPI	MDD-PRS	DLB	0.01615	0.0835	0.8500	0.8700	GR@ACE	158
38 NPI	BD-PRS	DLB	-0.2041	0.0833	0.0150	0.1200	GR@ACE	158
39 NPI	SCZ-PRS	DLB	-0.1564	0.0824	0.0600	0.2400	GR@ACE	158
40 NPI	ASD-PRS	DLB	0.0469	0.0832	0.5700	0.7600	GR@ACE	158
41 NPI	MDD-PRS	FTD	-0.0717	0.0598	0.2300	0.3680	ADC	317
42 NPI	BD-PRS	FTD	-0.0973	0.0585	0.0970	0.3200	ADC	317
43 NPI	SCZ-PRS	FTD	-0.1698	0.0589	0.0042	0.0336	ADC	317
44 NPI	ASD-PRS	FTD	-0.0763	0.0589	0.2000	0.3680	ADC	317
45 NPI	MDD-PRS	FTD	0.0581	0.0947	0.5400	0.7200	GR@ACE	111
46 NPI	BD-PRS	FTD	-0.023	0.0939	0.8100	0.9257	GR@ACE	111
47 NPI	SCZ-PRS	FTD	-0.1457	0.0923	0.1200	0.3200	GR@ACE	111
48 NPI	ASD-PRS	FTD	-0.0019	0.0937	0.9800	0.9800	GR@ACE	111

Supplementary table 3. Associations between psychiatric polygenic risk scores (PRS) and Geriatric Depression Scale (GDS) scores across dementia subtypes among four cohorts (ADC, GR@ACE, DELCODE, and AgeCoDe)

Trait	PRS	Dementia	Beta	SE	P	pfd	Cohort	N
GDS	MDD-PRS	AD	0.042794	0.016699	0.0100	0.1600	ADC	1582
GDS	BD-PRS	AD	-0.01145	0.016666	0.4900	0.7127	ADC	1582
GDS	SCZ-PRS	AD	-0.01796	0.016721	0.2800	0.5600	ADC	1582
GDS	ASD-PRS	AD	0.029473	0.016641	0.0770	0.4107	ADC	1582
GDS	MDD-PRS	AD	-0.00562	0.0025	0.0220	0.1760	GR@ACE	4096
GDS	BD-PRS	AD	-3.2E-05	0.0025	0.9900	0.9900	GR@ACE	4096
GDS	SCZ-PRS	AD	0.002114	0.0025	0.3900	0.6240	GR@ACE	4096
GDS	ASD-PRS	AD	-0.00126	0.0025	0.6100	0.8133	GR@ACE	4096
GDS	MDD-PRS	AD	-0.09	0.06	0.1400	0.5120	DELCODE	111
GDS	BD-PRS	AD	0.07	0.06	0.2500	0.5600	DELCODE	111
GDS	SCZ-PRS	AD	0.09	0.06	0.1600	0.5120	DELCODE	111
GDS	ASD-PRS	AD	0.07	0.06	0.2800	0.5600	DELCODE	111
GDS	MDD-PRS	AD	0.009681	0.042972	0.8200	0.8747	AgeCoDe	275
GDS	BD-PRS	AD	0.037285	0.043457	0.3900	0.6240	AgeCoDe	275
GDS	SCZ-PRS	AD	0.015861	0.043315	0.7100	0.8343	AgeCoDe	275
GDS	ASD-PRS	AD	-0.01495	0.044047	0.7300	0.8343	AgeCoDe	275
GDS	MDD-PRS	DLB	-0.08149	0.042636	0.0570	0.4560	ADC	220
GDS	BD-PRS	DLB	0.007423	0.043966	0.8700	0.9300	ADC	220
GDS	SCZ-PRS	DLB	0.017117	0.043539	0.6900	0.9300	ADC	220
GDS	ASD-PRS	DLB	0.005019	0.044064	0.9100	0.9300	ADC	220
GDS	MDD-PRS	DLB	-0.0016	0.0113	0.8900	0.9300	GR@ACE	158
GDS	BD-PRS	DLB	-0.0136	0.0115	0.2400	0.9300	GR@ACE	158
GDS	SCZ-PRS	DLB	-0.0093	0.0113	0.4100	0.9300	GR@ACE	158
GDS	ASD-PRS	DLB	-0.0009	0.0113	0.9300	0.9300	GR@ACE	158
GDS	MDD-PRS	FTD	0.017874	0.041654	0.6700	0.8114	ADC	317
GDS	BD-PRS	FTD	-0.02406	0.041877	0.5700	0.8114	ADC	317
GDS	SCZ-PRS	FTD	-0.08148	0.041451	0.0500	0.4000	ADC	317
GDS	ASD-PRS	FTD	-0.0011	0.041851	0.9800	0.9800	ADC	317
GDS	MDD-PRS	FTD	0.0061	0.0164	0.7100	0.8114	GR@ACE	111
GDS	BD-PRS	FTD	0.0236	0.0161	0.1500	0.6000	GR@ACE	111
GDS	SCZ-PRS	FTD	0.0179	0.0161	0.2700	0.7200	GR@ACE	111
GDS	ASD-PRS	FTD	-0.0113	0.0162	0.4900	0.8114	GR@ACE	111

The Geriatric Depression Scale was based on the total score of the 15-item version and log-transformed; ADC=Amsterdam Dementia Cohort; GR@ACE=Genome Research at Ace Alzheimer Center Barcelona; DELCODE=the DZNE-Longitudinal Cognitive Impairment and Dementia; AgeCoDe=the Ageing, Cognition and Dementia in Primary Care Patients; MDD-PRS=PRS for major depressive disorder; BD-PRS=PRS for bipolar disorder type I, SCZ-PRS=PRS for schizophrenia; ASD-PRS=PRS for autism spectrum disorder; SE=Standard Error; pfd=false discovery rate adjusted p-values

Supplementary Figure 1. Polygenic risk score (PRS) for psychiatric traits in relation to Neuropsychiatric Inventory (NPI) total scores, including C-NPI-12 results only (excluding C-NPI-Q scores from the GR@ACE cohort).



Supplementary figure legend

Supplementary Figure 1. Meta-analyses of psychiatric polygenic risk scores (PRS) in relation to total Neuropsychiatric Inventory (NPI-12) scores across dementia subtypes (Alzheimer's disease [AD], dementia with Lewy bodies [DLB], and frontotemporal dementia [FTD]). The C-NPI-12 score was log-transformed and calculated as sum of frequency*severity across 12 domains. Forest plot showing the meta-analytic estimates (beta coefficient and 95% confidence intervals [CI]) across for the association between PRS and NPI. Multiple testing correction was addressed using false discovery rate (FDR). A $p_{fdr} < 0.05$ was considered significant.