

Figure S1: Radial plots to visualize individual outlier single nucleotide polymorphisms (SNPs) in the Mendelian randomization (MR) estimates for association between AD and psychiatric disorders. IVW and MR-Egger outliers (Purple dot) were removed.

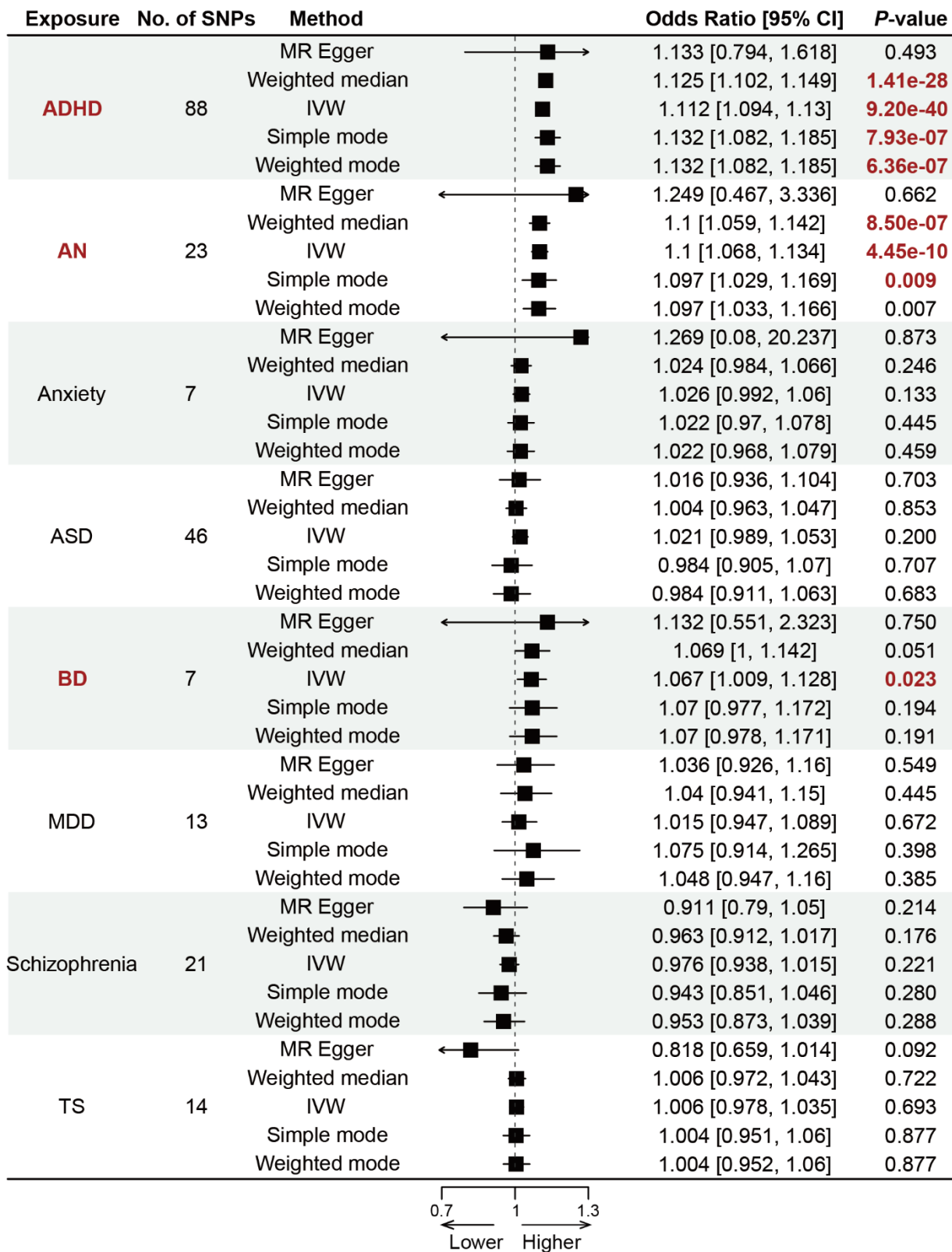


Figure S2: Forest plots of the causal association using two-sample MR analysis methods between atopic dermatitis and psychiatric disorders. Mental disorder including ADHD, AN, Anxiety, ASD, BD, MDD, Schizophrenia and TS as exposures, and atopic dermatitis as outcome.

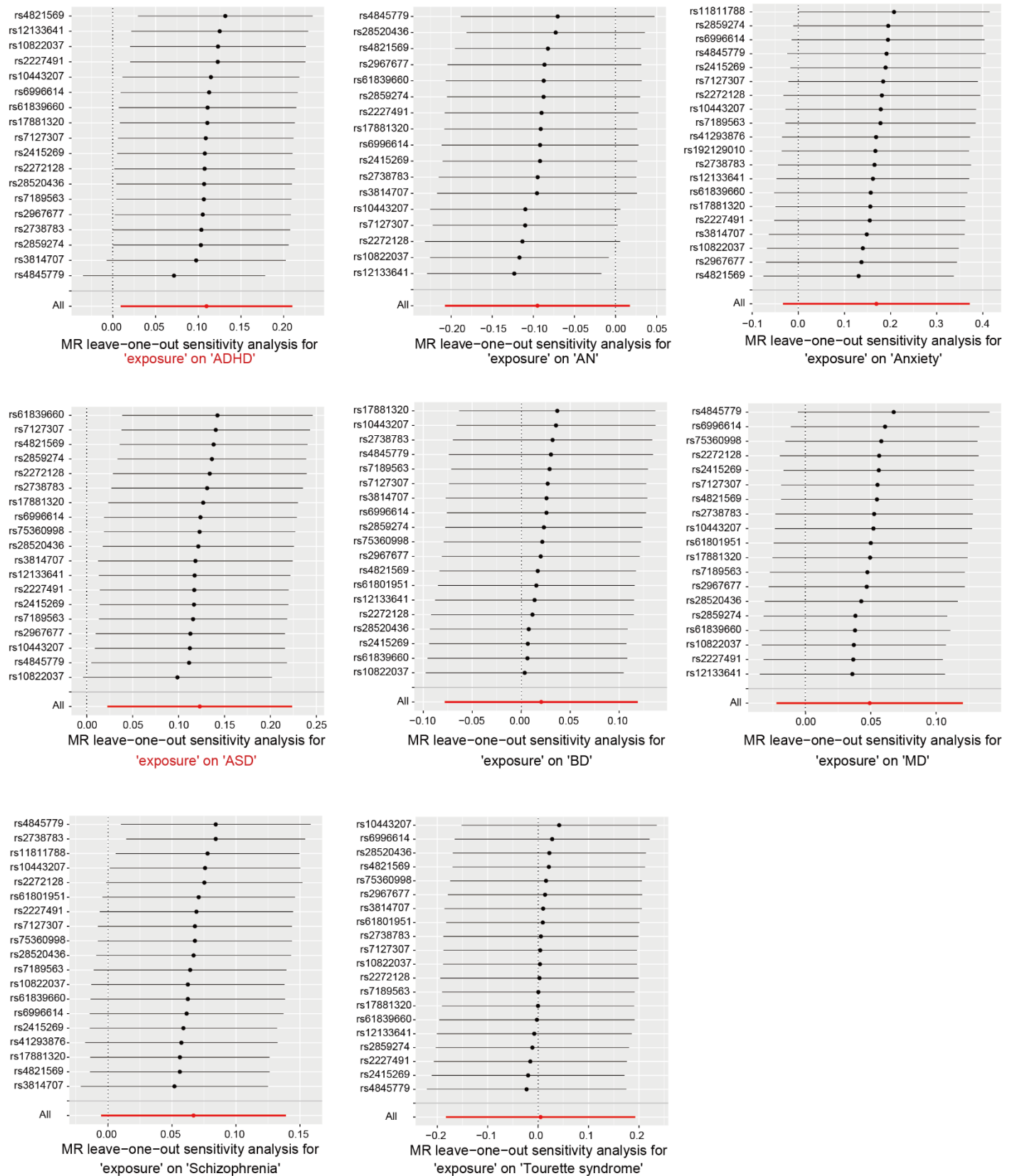


Figure S3: Leave-one-out plots of the causal relationships between atopic dermatitis and psychiatric disorders.

Table S1. Summary of the casual relationships of atopic dermatitis (AD) and psychiatric disease with Mendelian randomization method

Outcome	SNP	Method	Beta	SE	P-value
ADHA	18	MR Egger	0.496	0.190	0.019
		Weighted median	0.136	0.073	0.063
		IVW	0.110	0.051	0.033
		Simple mode	0.162	0.122	0.203
		Weighted mode	0.155	0.122	0.223
AN	17	MR Egger	-0.359	0.209	0.107
		Weighted median	-0.145	0.075	0.054
		IVW	-0.095	0.057	0.098
		Simple mode	-0.210	0.138	0.150
		Weighted mode	-0.214	0.128	0.114
Anxiety	20	MR Egger	0.213	0.420	0.617
		Weighted median	0.183	0.144	0.203
		IVW	0.169	0.103	0.101
		Simple mode	0.265	0.235	0.275
		Weighted mode	0.139	0.224	0.542
ASD	19	MR Egger	0.108	0.171	0.537
		Weighted median	0.164	0.074	0.026
		IVW	0.123	0.051	0.016
		Simple mode	0.216	0.128	0.108
		Weighted mode	0.198	0.116	0.107
BD	19	MR Egger	0.075	0.161	0.647
		Weighted median	-0.020	0.071	0.775
		IVW	0.020	0.050	0.685
		Simple mode	-0.032	0.131	0.811
		Weighted mode	-0.035	0.110	0.757
MDD	19	MR Egger	-0.032	0.111	0.777
		Weighted median	0.002	0.046	0.970
		IVW	0.049	0.036	0.177
		Simple mode	-0.045	0.094	0.636
		Weighted mode	-0.055	0.073	0.462
Schizophrenia	19	MR Egger	-0.034	0.114	0.766
		Weighted median	0.040	0.047	0.391
		IVW	0.067	0.037	0.070
		Simple mode	0.040	0.103	0.704
		Weighted mode	-0.026	0.101	0.800
TS	20	MR Egger	-0.240	0.319	0.462
		Weighted median	0.027	0.129	0.833
		IVW	0.005	0.096	0.959
		Simple mode	0.058	0.224	0.799
		Weighted mode	0.054	0.200	0.790

Table S2. The casual relationships of psychiatric disease and atopic dermatitis (AD) with reverse Mendelian randomization (MR) method

Exposure	SNP	Method	Beta	SE	P-value
ADHA	88	MR Egger	0.125	0.182	0.493
		Weighted median	0.118	0.011	1.41e-28
		IVW	0.106	0.008	9.20e-40
		Simple mode	0.124	0.023	7.93e-07
		Weighted mode	0.124	0.023	6.36e-07
AN	23	MR Egger	0.222	0.501	0.662
		Weighted median	0.095	0.019	8.50e-07
		IVW	0.095	0.015	4.45e-10
		Simple mode	0.092	0.032	0.009
		Weighted mode	0.093	0.031	0.007
Anxiety	7	MR Egger	0.238	1.413	0.873
		Weighted median	0.024	0.02	0.246
		IVW	0.025	0.017	0.133
		Simple mode	0.022	0.027	0.445
		Weighted mode	0.022	0.028	0.459
ASD	46	MR Egger	0.016	0.042	0.703
		Weighted median	0.004	0.021	0.853
		IVW	0.021	0.016	0.200
		Simple mode	-0.016	0.043	0.707
		Weighted mode	-0.016	0.039	0.683
BD	7	MR Egger	0.124	0.367	0.750
		Weighted median	0.066	0.034	0.051
		IVW	0.065	0.028	0.023
		Simple mode	0.068	0.046	0.194
		Weighted mode	0.068	0.046	0.191
MDD	13	MR Egger	0.036	0.057	0.549
		Weighted median	0.039	0.051	0.445
		IVW	0.015	0.036	0.672
		Simple mode	0.073	0.083	0.398
		Weighted mode	0.047	0.052	0.385
Schizophrenia	21	MR Egger	-0.093	0.073	0.214
		Weighted median	-0.038	0.028	0.176
		IVW	-0.025	0.02	0.221
		Simple mode	-0.058	0.053	0.280
		Weighted mode	-0.048	0.044	0.288
TS	14	MR Egger	-0.201	0.11	0.092
		Weighted median	0.006	0.018	0.722
		IVW	0.006	0.014	0.693
		Simple mode	0.004	0.028	0.877
		Weighted mode	0.004	0.028	0.877

Table S3. The horizontal pleiotropy and heterogeneity results in reverse MR

Exposure	Horizontal pleiotropy			Heterogeneity			
				MR Egger		IVW	
	Intercept	SE	P-value	Q	P-value	Q	P-value
ADHD	-0.002	0.018	0.917	16.193	1	16.204	1
AN	-0.020	0.078	0.803	2.350	1	2.414	1
Anxiety	-0.032	0.216	0.886	0.073	1	0.095	1
ASD	0.0004	0.004	0.911	42.612	0.531	42.625	0.573
BD	-0.006	0.035	0.878	0.196	0.999	0.222	1
MDD	-0.002	0.004	0.659	6.792	0.816	6.998	0.858
Schizophrenia	0.006	0.007	0.337	20.998	0.337	22.068	0.337
TS	0.029	0.015	0.082	1.224	1	4.838	0.979

IVW: Inverse variance weighted

ADHD: Attention deficit hyperactivity disorder

AN: Anorexia nervosa

ASD: Autism spectrum disorder

BD: Bipolar disorder

MDD: Major depressive disorder

TS: Tourette syndrome