

**Table S1:** Eligible studies examining the casual association between micronutrients and AD.

<b>classification of micronutrient</b>	<b>exposure</b>	<b>id</b>	<b>trait</b>	<b>Reference (PMID)</b>
Mineral	Magnesium	ukb-b-5536	Vitamin and/or mineral supplement use: Magnesium	NA
		ukb-b-6539	Treatment/medication code: minerals - magnesium	NA
	Calcium	ukb-d-30680_raw	Calcium	NA
		bbj-a-15	Calcium	29403010
		ukb-d-30680_irnt	Calcium	NA
		ukb-a-495	Mineral and other dietary supplements: Calcium	NA
		ukb-b-19550	Vitamin and/or mineral supplement use: Calcium	NA
		ukb-b-7043	Mineral and other dietary supplements: Calcium	NA
	Iron	ieu-a-1049	Iron	25352340
		ukb-b-18395	Treatment/medication code: iron product	NA
ukb-b-14863		Mineral and other dietary supplements: Iron	NA	
ukb-b-15326		Vitamin and/or mineral supplement use: Multivitamin with iron	NA	
Copper	ieu-a-1073	Copper	23720494	
	ieu-a-1074	Copper	23720494	
Zinc	ieu-a-1080	Zinc	23720494	
	ieu-a-1079	Zinc	23720494	
	ukb-a-496	Mineral and other dietary supplements: Zinc	NA	
	ukb-b-19262	Treatment/medication code: zinc product	NA	
	ukb-b-10567	Vitamin and/or mineral supplement use: Zinc	NA	
	ukb-b-13891	Mineral and other dietary supplements: Zinc	NA	
	Selenium	ieu-a-1075	Selenium	23720494

		ieu-a-1076	Selenium	23720494
		ieu-a-1077	Selenium	23720494
		ieu-a-1078	Selenium	23720494
		ukb-a-497	Mineral and other dietary supplements: Selenium	NA
		ukb-b-19158	Mineral and other dietary supplements: Selenium	NA
		ukb-b-16639	Vitamin and/or mineral supplement use: Selenium	NA
		ukb-b-20415	Treatment/medication code: selenium product	NA
	Phosphorus	bbj-a-45	Phosphorus	29403010
Vitamin	Vitamin A	ukb-a-458	Vitamin and mineral supplements: Vitamin A	NA
		ukb-b-9596	Vitamin and mineral supplements: Vitamin A	NA
	Vitamin B	ukb-b-129	Vitamin and/or mineral supplement use: Vitamin B6	NA
		ukb-b-18819	Treatment/medication code: vitamin b12 preparation	NA
		ukb-a-460	Vitamin and mineral supplements: Vitamin B	NA
		ukb-b-10188	Vitamin and mineral supplements: Vitamin B	NA
		ukb-b-5474	Vitamin and/or mineral supplement use: Vitamin B12	NA
		ukb-a-135	Treatment/medication code: vitamin b12 preparation	NA
		ukb-b-288	Treatment/medication code: folic acid product	NA
		ukb-b-3563	Vitamin and mineral supplements: Folic acid or Folate (Vit B9)	NA
		ukb-a-134	Treatment/medication code: hydroxocobalamin product	NA
	Vitamin C	met-a-348	Ascorbate (Vitamin C)	24816252
		ukb-b-12466	Treatment/medication code: vitamin c product	NA
		ukb-b-15175	Vitamin and mineral supplements: Vitamin C	NA
		ukb-b-488	Treatment/medication code: vitamin c product	NA
		ukb-b-4690	Vitamin and/or mineral supplement use: Vitamin C	NA
		ukb-a-461	Vitamin and mineral supplements: Vitamin C	NA

Vitamin D	ebi-a-GCST005367	Vitamin D levels	29343764
	ukb-d-30890_irnt	Vitamin D	NA
	ukb-d-30890_raw	Vitamin D	NA
	ukb-b-6549	Treatment/medication code: calcium+vitamin d 500units tablet	NA
	ukb-a-462	Vitamin and mineral supplements: Vitamin D	NA
	ukb-b-5079	Vitamin and/or mineral supplement use: Vitamin D	NA
	ukb-b-4991	Treatment/medication code: vitamin d product	NA
	ukb-b-12648	Vitamin and mineral supplements: Vitamin D	NA
Vitamin E	met-a-340	Alpha-tocopherol	24816252
	met-a-571	Gamma-tocopherol	24816252
	ukb-b-16288	Treatment/medication code: vitamin e product	NA
	ukb-a-463	Vitamin and mineral supplements: Vitamin E	NA
	ukb-b-12506	Vitamin and mineral supplements: Vitamin E	NA
	ukb-b-14518	Vitamin and/or mineral supplement use: Vitamin E	NA

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**Table S2.** 2SMR estimations of the causality between vitamin levels and AD risk.

Vitamins	Exposure	Method	Numbers of SNPs	b	se	P-value
Vitamin D	Vitamin D levels    id:ebi-a-GCST005367	MR Egger	6	-0.63810815	0.954830196	0.540531921
		Inverse variance weighted	6	-0.747156172	0.28860411	0.009629372
		Weighted median	6	-0.563408401	0.355727854	0.113234999
		Weighted mode	6	-0.531110588	0.382149773	0.223293562
	Vitamin D    id:ukb-d-30890_irnt	MR Egger	44	-0.192041644	0.092921335	0.044962359
		Inverse variance weighted	44	-0.154339158	0.069573184	0.026529523
		Weighted median	44	-0.19318717	0.079268594	0.014804716
		Weighted mode	44	-0.193702196	0.067368648	0.006254783
	Vitamin D    id:ukb-d-30890_raw	MR Egger	42	-0.002923992	0.012859734	0.82128975
		Inverse variance weighted	42	-0.00972508	0.009869781	0.324457589
		Weighted median	42	-0.009052643	0.003686014	0.014051521
		Weighted mode	42	-0.008255205	0.003281785	0.015900168

**Table S3.** 2SMR estimations of the causality between vitamin supplements and AD risk.

<b>Vitamin Supplements</b>	<b>Exposure</b>	<b>Method</b>	<b>Numbers of SNPs</b>	<b>b</b>	<b>se</b>	<b>P-value</b>
folic acid (vitamin B9)	Treatment/medication code: folic acid product    id:ukb-b-288	Inverse variance weighted	2	-15.16307096	17.54776697	0.387531534
		MR Egger	3	-126.7589927	396.6162332	0.803067355
Cobalamin (vitamin B12)	Treatment/medication code: hydroxocobalamin product    id:ukb-a-134	Inverse variance weighted	3	-2.004701679	51.44816342	0.968917922
		Weighted median	3	10.41565106	60.01228502	0.862212333
		Weighted mode	3	15.75051463	73.08066139	0.849342165

**Table S4.** 2SMR estimations of the causality between mineral levels and AD risk.

Minerals	Exposure	Method	Numbers of SNPs	b	se	P-value
Calcium	Calcium    id:bbj-a-15	MR Egger	11	-1.168569755	0.994028955	0.269919988
		Inverse variance weighted	11	-0.020657052	0.220731999	0.925439374
		Weighted median	11	0.00923976	0.221459891	0.96672028
		Weighted mode	11	0.031522561	0.300069405	0.918412676
	Calcium    id:ukb-d-30680_irt	MR Egger	159	-0.205664363	0.098924066	0.039242512
		Inverse variance weighted	159	0.005876516	0.055790889	0.916113085
		Weighted median	159	-0.156079035	0.099990353	0.118537688
		Weighted mode	159	-0.150615598	0.093407305	0.108857409
	Calcium    id:ukb-d-30680_raw	MR Egger	153	-2.648939899	1.102806015	0.017520719
		Inverse variance weighted	153	0.333864268	0.621185044	0.590947513
		Weighted median	153	-1.661373081	1.062368938	0.117855581
		Weighted mode	153	-1.902975481	1.122387243	0.092033457
Iron	Iron    id:ieu-a-1049	MR Egger	3	-0.078580602	0.117416321	0.624529719
		Inverse variance weighted	3	-0.025620846	0.058841429	0.663256227
		Weighted median	3	-0.03165185	0.064509088	0.623668909

Copper	Copper    id:ieu-a-1073	Weighted mode	3	-0.03347395	0.070244165	0.680678574
		Inverse variance weighted	2	-0.144584218	0.072598111	0.04641826
Zinc	Zinc    id:ieu-a-1079	Inverse variance weighted	2	-0.014035699	0.075691812	0.85289006
Phosphorus	Phosphorus    id:bbj-a-45	MR Egger	7	-0.165393414	0.472403763	0.740521736
		Inverse variance weighted	7	0.057060034	0.134837365	0.672166333
		Weighted median	7	0.020854088	0.136925921	0.87894877
		Weighted mode	7	-0.050007121	0.173442392	0.782801902

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**Table S5.** 2SMR estimations of the causality between mineral supplements and AD risk.

<b>Mineral Supplements</b>	<b>Exposure</b>	<b>Method</b>	<b>Numbers of SNPs</b>	<b>b</b>	<b>se</b>	<b>P-value</b>
Calcium	Mineral and other dietary supplements: Calcium    id:ukb-a-495	Inverse variance weighted	2	-0.575650421	3.373836605	0.864521075
		MR Egger	4	-3.282264455	12.20764426	0.813226031
		Inverse variance weighted	4	-1.037451624	2.660370704	0.696562383
		Weighted median	4	-1.449278878	3.190808876	0.649681841
Zinc	Mineral and other dietary supplements: Zinc    id:ukb-b-13891	Weighted mode	4	-1.49765712	3.68180572	0.711455801
		MR Egger	3	-5.382937355	17.31287291	0.808093652
		Inverse variance weighted	3	-1.9467875	4.379315265	0.656651111
		Weighted median	3	-5.33414394	5.023504184	0.288309569
		Weighted mode	3	-6.046820818	6.229867988	0.434126157