

Supplementary material

Supplementary Table 1. Diagnostic criteria

Hashimotos thyroiditis				
	ICD10	ICD9	ICD8	ICD7
Inclusion criteria	E035 E039 E063 E065	244X 245C 245W	244,0 245,03	253,00 253,19 253,29 254,00
	Or: A diagnosis of Addison's disease or type-1 diabetes and at least two filled prescriptions for levothyroxine (ATC-H03AA)			
Exclusion criteria	E030 E031 E032 E033 E050 E055 E064 E890 E00 E01 E02 E060 E061	242A 243 244A 244B 244C 244D 244W 246B	242,00 242,09 243,99 245,00 245,01 245,02 245,04 244,00	057,11 252,00 252,01 252,02
	Or: procedural codes BAA60, BAA40, BAA50, BAA20 810, 811, 814, 820, 812, 813, 822, 824, 830 Or: If alive 1 jan 2006; failure to fill at least two prescription for levothyroxine (ATC- H03AA)			
Type 1 diabetes				
Inclusion criteria	Included in the National Diabetes Register with a diagnosis of type-1 diabetes at age 30 years or younger, and treated with insulin only.			
Exclusion criteria	None			

Supplementary Table 2. Association and familial co-aggregation between type 1 diabetes and Hashimoto's thyroiditis.

	Crude risk ratio	Adjusted ^a risk ratio
Between disorders^b		
Within individual association	9.9 (7.2-13.6)	13.6 (9.6-19.3)
Co-aggregation monozygotic	6.7 (3.1-14.8)	8.0 (3.4-18.9)
Co-aggregation dizygotic	1.3 (0.6-3.2)	1.8 (0.7-4.3)

^a Adjusted for sex and birth cohort

^b Hashimoto's thyroiditis was considered exposure and Type 1 diabetes outcome.

Supplementary Table 3. Quantitative genetic results, crude models.

		ACE	ADE	AE	CE
AIC		-443,224.70	-443,223.09	-443,228.84	-443,142.79
BIC		-2,420,611.63	-2,420,610.02	-2,420,642.54	-2,420,556.49
<i>Univariate estimates</i>					
T1D					
	A	81% (50-100)	69% (12-100)	83% (76-89)	NA
	D	NA	15% (0-73)	NA	NA
	H	81% (50-100)	83% (77-90)	83% (76-89)	NA
	C	2% (0-31)	NA	NA	74% (68-80)
	E	17% (10-24)	17% (10-23)	17% (11-24)	26% (20-32)
HT					
	A	60% (45-76)	70% (45-95)	71% (66-75)	NA
	D	NA	0 (0-27)	NA	NA
	H	60% (45-76)	71% (65-76)	71% (66-75)	NA
	C	9% (0-22)	NA	NA	57% (53-61)
	E	31% (26-36)	29% (24-35)	29% (25-34)	43% (39-47)
<i>Bivariate estimates</i>					
	Phenotypic correlation	0.37 (0.31-0.43)	0.34 (-0.18-0.87)	0.37 (0.31-0.43)	0.34 (0.29-0.40)
	r_A	0.35 (-0.11-0.82)	0.26 (-0.45-0.97)	0.26 (0.13-0.40)	NA
	r_D	NA	1.00 (-1.00-1.00)	NA	NA
	r_H	0.35 (-0.11-0.82)	0.27 (0.12-0.41)	0.26 (0.13-0.40)	NA
	r_C	-1.00 (-1.00-1.00)	NA	NA	0.14 (0.02-0.27)
	r_E	0.71 (0.34-1.00)	0.73 (0.35-1.00)	0.73 (0.38-1.00)	0.75 (0.54-0.96)
	Bivariate A	67% (-20-154)	53% (-15-120)	55% (31-80)	NA
	Bivariate D	NA	7% (-160-175)	NA	NA
	Bivariate H	67% (-20-154)	60% (-49-169)	55% (31-80)	NA
	Bivariate C	-12% (-84-61)	NA	NA	27% (4-49)
	Bivariate E	45% (18-72)	47% (-20-115)	45% (20-69)	73% (51-96)

AIC, Akaike's information criterion; BIC, Bayesian information criterion; T1D, type 1 diabetes; HT, Hashimoto's thyroiditis; A, additive genetics/narrow sense heritability; D, dominance deviations; H, broad sense heritability (A+D); C, shared environment; E, individually unique environment; ACE, ADE, AE, CE, models containing named sources of (co)variance; NA, not applicable; Bivariate A, explained phenotypic correlation by A sources of (co)variance (similar for, H, C, and E).

Confidence intervals are of Wald-type, thus they may span outside the parameter space, when this happened the interval has been truncated at the parameter bound. **Bold** font indicates best fitting model according to AIC and BIC.

Supplementary table 4. Quantitative genetic results, adjusted^a models

	ACE	ADE	AE	CE
AIC	-443,178.04	-443,177.70	-443,183.30	-443,097.79
BIC	-2,420,493.59	-2,420,493.25	-2,420,525.62	-2,420,440.11
<i>Univariate estimates</i>				
T1D				
A	80% (50-100)	65% (9-100)	82% (75-88)	NA
D	NA	18% (0-74)	NA	NA
H	80% (50-100)	82% (76-89)	82% (75-88)	NA
C	1% (0-30)	NA	NA	72% (66-78)
E	18% (11-25)	18% (11-24)	18% (12-25)	28% (22-34)
HT				
A	0.60 (0.44-0.76)	0.66 (0.40-0.91)	67% (62-71)	NA
D	NA	0.01 (0.00-0.28)	NA	NA
H	0.60 (0.44-0.76)	0.67 (0.61-0.72)	67% (62-71)	NA
C	0.06 (0.00-0.19)	NA	NA	53% (49-57)
E	0.34 (0.29-0.39)	0.33 (0.28-0.39)	33% (29-38)	47% (43-51)
<i>Bivariate estimates</i>				
Phenotypic correlation	0.45 (0.39-0.50)	0.45 (0.39-0.51)	0.45 (0.39-0.50)	0.42 (0.37-0.47)
r_A	0.42 (-0.02-0.87)	0.35 (-0.39-1.00)	0.36 (0.23-0.48)	NA
r_D	NA	1.00 (-1.00-1.00)	NA	NA
r_H	0.42 (-0.02-0.87)	0.36 (0.23-0.50)	0.36 (0.23-0.48)	NA
r_C	-1.00 (-1.00-1.00)	NA	NA	0.24 (0.11-0.36)
r_E	0.73 (0.43-1.00)	0.74 (0.43-1.00)	0.74 (0.45-1.00)	0.75 (0.57-0.93)
Bivariate A	0.66 (-0.02-1.33)	0.51 (-0.58-1.59)	0.59 (0.41-0.77)	NA
Bivariate D	NA	0.10 (-1.05-1.24)	NA	NA
Bivariate H	0.66 (-0.02-1.33)	0.60 (0.41-0.80)	0.59 (0.41-0.77)	NA
Bivariate C	-0.06 (-0.64-0.51)	NA	NA	0.35 (0.18-0.52)
Bivariate E	0.41 (0.21-0.60)	0.40 (0.20-0.59)	0.41 (0.23-0.59)	0.65 (0.48-0.82)

AIC, Akaike's information criterion; BIC, Bayesian information criterion; T1D, type 1 diabetes; HT, Hashimoto's thyroiditis; A, additive genetics/narrow sense heritability; D, dominance deviations; H, broad sense heritability (A+D); C, shared environment; E, individually unique environment; ACE, ADE, AE, CE, models containing named sources of (co)variance; NA, not applicable; Bivariate A, explained phenotypic correlation by A sources of (co)variance (similar for D, H, C, and E).

Confidence intervals are of Wald-type, thus they may span outside the parameter space, but have been truncated at the parameter bound. **Bold** font indicates best fitting model according to AIC and BIC.

^a Adjusted for sex and birth cohort.

Supplementary Table 5. Concordances and discordances for APS-3, i.e. type 1 diabetes and Hashimoto's thyroiditis combined.

	Concordant non-affected	Discordant	Concordant affected	Concordance rate	Tetrachoric correlation ^a
APS-3 monozygotic	17,977	14	4	0.36 (0.17-0.74)	0.88 (0.76-1.00)
APS-3 dizygotic	37,386	26	0	0.000 (NA)	-0.62 (-1.00-1.00)

APS-3, having both type 1 diabetes and Hashimoto's thyroiditis.

^a Unadjusted.

Supplementary Table 6. Results for APS-3, i.e., type 1 diabetes and Hashimoto's combined, crude model.

	ACE	ADE	AE	CE
AIC	-220,829.15	-220,829.57	-220,831.15	-220,825.61
BIC	-1,209,536.00	-1,209,536.42	-1,209,546.92	-1,209,541.38
A	85% (71-98)	0% (0-0)	85% (71-98)	NA
D	NA	85% (72-99)	NA	NA
H	85% (71-98)	85% (72-99)	85% (71-98)	NA
C	0% (0-0)	NA	NA	74% (59-89)
E	15% (2-29)	15% (1-28)	15% (2-29)	26% (11-41)

AIC, Akaike's information criterion; BIC, Bayesian information criterion; A, additive genetics/narrow sense heritability; D, dominance deviations; H, broad sense heritability (A+D); C, shared environment; E, individually unique environment; ACE, ADE, AE, CE, models containing named sources of (co)variance; NA, not applicable.

Confidence intervals are of Wald-type, thus they may span outside the parameter space, when this happened the interval has been truncated at the parameter bound. **Bold font** indicates best fitting model according to AIC.

Supplementary Figure 1 Year of, and age at diagnosis.

