

ONLINE SUPPLEMENTAL INFORMATION

Land Cover of Early Life Environment Modulates the Risk of Type 1 Diabetes

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Table of Contents

Supplemental Table S1 — Land cover classification included in the CORINE 2012 data presented at the main class level (Level 1) and at the most detailed subclass level (Level 4).	3
Supplemental Table S2 —The association of agricultural and built environment around the home with the risk of type 1 diabetes and autoantibody positivity in boys and girls.	5
Supplemental Table S3 —The association of agricultural and built environment around the home with the risk of type 1 diabetes and autoantibody positivity in the two main endotypes of type 1 diabetes.....	6
Supplemental Table S4 —The association of agricultural area and built area around the home with type 1 diabetes or diabetes-related autoimmunity during the first year of life in the Oulu, Tampere, and Turku region.....	7
Supplemental Table S5 —The association of agriculture land cover and built environment around the home with the risk of type 1 diabetes and autoantibody positivity adjusted for HLA-conferred risk and study region.....	9
Supplemental Table S6 —Differences in bacterial communities transferred indoors during snowless (August) and continuous snow cover (February) period.....	10
References.....	11

Supplemental Table S1— Land cover classification included in the CORINE 2012 data presented at the main class level (Level 1) and at the most detailed subclass level (Level 4) (1).

Land cover class (Level 1)	Subclasses (Level 4)
Artificial surfaces (Built environment)	Continuous urban fabric Discontinuous urban fabric Commercial units Industrial units Road and rail networks and associated land Port areas Airports Mineral extraction sites Open cast mines Dump sites Construction sites Summer cottages Sport and leisure areas Golf courses Trotting tracks
Agricultural areas	Non-irrigated arable land Fruit trees and berry plantations Pastures Natural pastures Land principally occupied by agriculture, with significant areas of natural vegetation Agro-forestry areas
Forests and semi-natural areas	Broad-leaved forest on mineral soil Broad-leaved forest on peatland Coniferous forest on mineral soil Coniferous forest on peatland Coniferous forest on rocky soil Mixed forest on mineral soil Mixed forest on peatland Mixed forest on rocky soil Natural grassland Moors and heathland Transitional woodland/shrub, cc < 10% Transitional woodland/shrub, cc 10-30%, on mineral soil Transitional woodland/shrub, cc 10-30%, on peatland Transitional woodland/shrub, cc 10-30%, on rocky soil Transitional woodland/shrub, under power lines Beaches, dunes, and sand plains

Forests and semi-natural areas	Bare rock Sparsely vegetated areas
Wetlands	Inland marshes, terrestrial
	Inland marshes, aquatic
	Peatbogs
	Peat production sites
	Salt marshes, terrestrial
Water bodies	Salt marshes, aquatic
	Water courses
	Water bodies
	Sea and ocean

The table presents the main land cover classes and their subclasses included in the CORINE 2012 data produced for Finland and used in the analyses. Detailed classification criteria are described in the general CORINE 2012 nomenclature guidelines. All European Union-wide CORINE 2012 subclasses are not present in Finland. (2)

Supplemental Table S2—The association of agricultural and built environment around the home with the risk of type 1 diabetes and autoantibody positivity in boys and girls.

Land Cover Class	Area Radius*	Multiple Autoantibody Positivity		Type 1 Diabetes	
		OR (95% CI)	P value	OR (95% CI)	P value
Boys†					
Agriculture	50 m	0.12 (0.01 - 1.77)	0.12	0.20 (0.01 - 3.94)	0.29
	100 m	0.64 (0.21 - 1.96)	0.44	0.50 (0.12 - 2.02)	0.33
	250 m	0.63 (0.26 - 1.52)	0.30	0.47 (0.16 - 1.44)	0.19
	500 m	0.71 (0.31 - 1.65)	0.43	0.56 (0.20 - 1.61)	0.28
	1500 m	0.45 (0.17 - 1.14)	0.09	0.33 (0.10 - 1.07)	0.07
Built Environment	50 m	0.79 (0.35 - 1.82)	0.59	0.73 (0.27 - 1.94)	0.53
	100 m	0.98 (0.55 - 1.74)	0.95	0.79 (0.4 - 1.56)	0.51
	250 m	1.21 (0.69 - 2.13)	0.51	0.94 (0.48 - 1.83)	0.86
	500 m	1.25 (0.69 - 2.25)	0.46	1.16 (0.57 - 2.35)	0.68
	1500 m	1.68 (0.86 - 3.28)	0.13	1.67 (0.75 - 3.73)	0.21
Girls‡					
Agriculture	50 m	0.24 (0.02 - 3.58)	0.30	0.12 (0.00 - 3.83)	0.23
	100 m	0.63 (0.19 - 2.11)	0.45	0.49 (0.11 - 2.20)	0.35
	250 m	0.67 (0.26 - 1.72)	0.40	0.43 (0.13 - 1.47)	0.18
	500 m	0.65 (0.26 - 1.64)	0.36	0.46 (0.14 - 1.47)	0.19
	1500 m	0.67 (0.25 - 1.80)	0.43	0.42 (0.12 - 1.45)	0.17
Built Environment	50 m	2.15 (0.77 - 5.95)	0.14	1.68 (0.52 - 5.46)	0.39
	100 m	1.39 (0.72 - 2.68)	0.32	1.51 (0.69 - 3.30)	0.30
	250 m	1.41 (0.75 - 2.65)	0.28	1.55 (0.73 - 3.27)	0.25
	500 m	1.40 (0.73 - 2.70)	0.31	1.48 (0.68 - 3.22)	0.33
	1500 m	1.70 (0.80 - 3.61)	0.16	1.65 (0.68 - 4.02)	0.27

Analysis done using CORINE 2012 data and logistic regression. *Radius of the analyzed area around the home. †213 males with multiple autoantibodies and 149 males with type 1 diabetes compared to 5570 males without autoantibodies or type 1 diabetes. ‡171 females with multiple autoantibodies and 122 females with type 1 diabetes compared to 4709 females without autoantibodies or type 1 diabetes.

Supplemental Table S3—The association of agricultural and built environment around the home with the risk of type 1 diabetes and autoantibody positivity in the two main endotypes of type 1 diabetes.

Land Cover Class	Area Radius*	Multiple Autoantibody Positivity		Type 1 Diabetes	
		OR (95% CI)	P value	OR (95% CI)	P value
Endotype IAA first†					
Agriculture	50 m	0.34 (0.02-6.64)	.48	0.85 (0.04-17.23)	.91
	100 m	1.10 (0.31-3.88)	.88	1.02 (0.24-4.43)	.98
	250 m	0.64 (0.21-1.94)	.43	0.47 (0.12-1.81)	.28
	500 m	0.50 (0.16-1.54)	.23	0.43 (0.11-1.60)	.21
	1500 m	0.47 (0.14-1.54)	.21	0.47 (0.12-1.81)	.27
Built Environment	50 m	1.35 (0.44-4.12)	.60	1.03 (0.30-3.57)	.96
	100 m	1.06 (0.51-2.21)	.87	0.82 (0.36-1.87)	.64
	250 m	1.66 (0.08-3.45)	.18	1.13 (0.50-2.54)	.78
	500 m	2.03 (0.94-4.38)	.07	1.46 (0.62-3.47)	.39
	1500 m	2.23 (0.94-5.25)	.07	1.64 (0.62-4.36)	.32
Endotype GADA first‡					
Agriculture	50 m	0.75 (0.03-17.12)	.86	0.12 (0.00-21.14)	.43
	100 m	0.62 (0.12-3.20)	.57	0.12 (0.01-2.20)	.15
	250 m	0.90 (0.27-3.04)	.87	0.26 (0.03-1.91)	.18
	500 m	0.97 (0.30-3.16)	.97	0.31 (0.05-1.99)	.22
	1500 m	0.59 (0.15-2.28)	.45	0.11 (0.01-0.97)	.047
Built Environment	50 m	0.81 (0.24-2.81)	.75	0.58 (0.12-2.81)	.50
	100 m	1.03 (0.44-2.42)	.95	0.91 (0.30-2.75)	.87
	250 m	1.16 (0.51-2.68)	.72	1.57 (0.51-4.79)	.43
	500 m	1.19 (0.50-2.84)	.70	1.75 (0.55-5.62)	.35
	1500 m	1.95 (0.72-5.30)	.19	3.23 (0.87-12.06)	.08

Analysis done using CORINE 2012 data and logistic regression. *Radius of the analyzed area around the home. †Insulin autoantibody (IAA) as a first appearing autoantibody; 131 children with multiple autoantibodies, 100 children with type 1 diabetes. These were compared with 10279 children without type 1 diabetes or autoantibodies. ‡Glutamic acid decarboxylase autoantibody (GADA) as a first appearing autoantibody; 96 children with multiple autoantibodies, 56 children with type 1 diabetes. These were compared with 10279 children without type 1 diabetes or autoantibodies.

Supplemental Table S4—The association of agricultural area and built area around the home with type 1 diabetes or diabetes-related autoimmunity during the first year of life in the Oulu, Tampere, and Turku region.

Land Cover Class	Area Radius*	Multiple Autoantibody Positivity		Type 1 Diabetes	
		OR (95% CI)	P value	OR (95% CI)	P value
Oulu region†					
Agriculture	50 m	0.20 (0.00-10.14)	0.42	0.11 (0.00-14.38)	0.37
	100 m	1.22 (0.30-4.99)	0.78	1.16 (0.22-6.12)	0.86
	250 m	0.63 (0.20-2.04)	0.44	0.49 (0.12-2.07)	0.33
	500 m	0.69 (0.24-2.03)	0.50	0.58 (0.16-2.15)	0.42
	1500 m	0.44 (0.14-1.43)	0.17	0.48 (0.12-1.88)	0.30
Built Environment	50 m	1.33 (0.33-5.38)	0.69	1.10 (0.22-5.49)	0.91
	100 m	1.23 (0.55-2.75)	0.62	1.17 (0.46-3.00)	0.75
	250 m	1.17 (0.55-2.49)	0.69	1.05 (0.43-2.52)	0.92
	500 m	1.12 (0.51-2.47)	0.78	1.19 (0.47-3.01)	0.72
	1500 m	2.27 (0.84-6.13)	0.11	2.08 (0.65-6.62)	0.22
Tampere region‡					
Agriculture	50 m	0.38 (0.02-8.61)	0.55	0.41 (0.01-14.59)	0.62
	100 m	0.41 (0.08-2.21)	0.30	0.30 (0.04-2.37)	0.25
	250 m	0.90 (0.27-2.97)	0.86	0.63 (0.14-2.78)	0.54
	500 m	1.33 (0.41-4.33)	0.63	0.94 (0.22-4.00)	0.93
	1500 m	0.79 (0.16-3.89)	0.77	0.27 (0.03-2.16)	0.22
Built Environment	50 m	0.91 (0.30-2.75)	0.87	0.64 (0.19-2.22)	0.49
	100 m	0.95 (0.44-2.05)	0.90	0.79 (0.33-1.89)	0.60
	250 m	0.99 (0.47-2.09)	0.98	0.74 (0.32-1.74)	0.49
	500 m	0.91 (0.41-2.00)	0.82	0.74 (0.30-1.83)	0.52
	1500 m	0.86 (0.33-2.24)	0.75	1.00 (0.33-3.05)	1.00
Turku region§					
Agriculture	50 m	0.07 (0.00-1.43)	0.09	0.08 (0.00-3.07)	0.18
	100 m	0.47 (0.13-1.70)	0.25	0.33 (0.06-1.79)	0.20
	250 m	0.46 (0.16-1.29)	0.14	0.31 (0.08-1.23)	0.10
	500 m	0.36 (0.13-1.00)	0.05	0.26 (0.07-1.00)	0.05
	1500 m	0.35 (0.12-1.02)	0.05	0.25 (0.06-0.96)	0.04
Built Environment	50 m	1.56 (0.59-4.14)	0.37	1.53 (0.46-5.11)	0.49
	100 m	1.33 (0.67-2.65)	0.42	1.30 (0.56-3.05)	0.54
	250 m	1.82 (0.92-3.62)	0.09	2.07 (0.88-4.88)	0.10
	500 m	1.99 (0.98-4.03)	0.06	2.32 (0.96-5.59)	0.06
	1500 m	2.00 (0.97-4.15)	0.06	2.04 (0.83-5.00)	0.12

Comparison to autoantibody negative children (Oulu N=3187, Tampere N=3594, and Turku N=3508) within study regions using CORINE 2012 data and logistic regression. *Radius of the analyzed area around the home. †119 children with multiple autoantibodies, 87 children with

type 1 diabetes Oulu region. ‡120 children with multiple autoantibodies, 89 children with type 1 diabetes in Tampere region. §145 children with multiple autoantibodies, 95 children with type 1 diabetes in Turku region.

Supplemental Table S5—The association of agriculture land cover and built environment around the home with the risk of type 1 diabetes and autoantibody positivity adjusted for HLA-conferred risk and study region.

Area Radius*	Multiple Autoantibody Positivity				Type 1 Diabetes			
	OR (95% CI)	P†	adj. OR (95% CI)‡	adj. P§	OR (95% CI)	P†	adj. OR (95% CI)‡	adj. P§
Agriculture								
50 m	0.17 (0.03-1.13)	0.07	0.14 (0.02-1.01)	0.05	0.16 (0.02-1.52)	0.11	0.13 (0.01-1.37)	0.09
100 m	0.64 (0.28-1.44)	0.28	0.59 (0.26-1.36)	0.21	0.49 (0.18-1.37)	0.18	0.48 (0.17-1.35)	0.16
250 m	0.64 (0.34-1.23)	0.18	0.60 (0.31-1.16)	0.13	0.46 (0.20-1.04)	0.06	0.46 (0.20-1.06)	0.07
500 m	0.68 (0.36-1.27)	0.22	0.60 (0.32-1.15)	0.12	0.51 (0.24-1.12)	0.09	0.50 (0.23-1.11)	0.09
1500 m	0.54 (0.27-1.06)	0.08	0.41 (0.20-0.86)	0.02	0.37 (0.16-0.87)	0.02	0.31 (0.13-0.77)	0.01
Built Environment								
50 m	1.21 (0.63-2.30)	0.57	1.22 (0.63-2.36)	0.56	1.04 (0.49-2.22)	0.91	0.97 (0.45-2.10)	0.94
100 m	1.15 (0.75-1.77)	0.53	1.16 (0.75-1.80)	0.50	1.06 (0.64-1.76)	0.83	1.04 (0.62-1.75)	0.87
250 m	1.30 (0.85-1.98)	0.22	1.28 (0.84-1.96)	0.25	1.18 (0.72-1.94)	0.52	1.13 (0.68-1.86)	0.64
500 m	1.32 (0.85-2.04)	0.22	1.31 (0.84-2.04)	0.23	1.30 (0.77-2.18)	0.33	1.26 (0.74-2.13)	0.39
1500 m	1.69 (1.03-2.79)	0.04	1.65 (1.00-2.75)	0.05	1.66 (0.92-3.02)	0.09	1.66 (0.90-3.04)	0.10

Analysis done using CORINE 2012 data and multivariate logistic regression. *Radius of the analyzed area around the home. †P value. ‡Odds ratio and 95% confidence interval adjusted for HLA-conferred risk and study region. §P value adjusted for HLA-conferred risk and study region.

Supplemental Table S6—Differences in bacterial communities transferred indoors during snowless (August) and continuous snow cover (February) period. Average abundances of each bacterial taxa in the doormat samples were compared using Wilcox signed-rank test and the p-values were adjusted for multiple comparisons using Benjamini-Hochberg method. The most significant differences before adjustment for multiple comparisons are shown.

	Abundance (sd)		<i>P*</i>	adj. <i>P</i> †
	August	February		
Order level				
Enterobacteriales	600.91 (541.91)	38.90 (41.77)	<0.001	0.02
Gaiellales	19.18 (15.32)	5.30 (4.57)	0.003	0.08
Gammaproteobacteria incertae sedis	2.18 (1.94)	0.00 (0.00)	<0.001	0.03
Family level				
Enterobacteriaceae	600.91 (541.91)	38.90 (41.77)	<0.001	0.03
Methylobacteriaceae	76.00 (32.18)	33.40 (16.92)	0.005	0.08
Gaiellaceae	19.18 (15.32)	5.30 (4.57)	0.003	0.06
Sanguibacteraceae	29.55 (49.02)	2.50 (2.32)	0.002	0.06
Paenibacillaceae 1	11.36 (8.71)	5.00 (13.39)	0.003	0.06
Xanthobacteraceae	3.73 (2.33)	0.70 (0.82)	0.002	0.06
Gilvimarinus	2.09 (1.92)	0.00 (0.00)	<0.001	0.05
Genus level				
Enterobacteriaceae unclassified	538.73 (533.64)	31.90 (38.78)	0.000	0.06
Massilia	161.00 (116.11)	366.90 (211.71)	0.005	0.10
Methylobacterium	73.45 (32.39)	32.10 (16.03)	0.004	0.09
Gaiella	19.18 (15.32)	5.30 (4.57)	0.003	0.08
Clostridium sensu stricto	8.18 (5.6)	1.80 (3.01)	0.001	0.06
Sanguibacter	29.55 (49.02)	2.50 (2.32)	0.002	0.06
Paenibacillus	9.64 (7.55)	4.70 (13.14)	0.004	0.09
Labrys	3.27 (2.28)	0.60 (0.70)	0.001	0.06
Gilvimarinus unclassified	2.09 (1.92)	0.00 (0.00)	0.000	0.06

* *P* value. † *P* value adjusted for multiple comparisons.

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