

Supporting Information

Supplemental Table S1. Comparison of Baseline Characteristics of Included and Excluded Participants

	Overall N = 38,554	Included N = 20,158	Excluded N = 18,396	<i>P</i> -value
Sex				>0.9
Female	18,710 (49%)	9,781 (49%)	8,929 (49%)	
Male	19,844 (51%)	10,377 (51%)	9,467 (51%)	
Birth weight				0.2
<2500 g	3,642 (9.4%)	1,867 (9.3%)	1,775 (9.7%)	
≥2500 g	34,905 (91%)	18,288 (91%)	16,617 (90%)	
Missing	7	3	4	
Gestational age				0.2
<37 weeks	2,098 (5.4%)	1,070 (5.3%)	1,028 (5.6%)	
≥37 weeks	36,449 (95%)	19,085 (95%)	17,364 (94%)	
Missing	7	3	4	
Number of elder siblings at 6 months				<0.001
≥1	20,030 (52%)	10,112 (50%)	9,918 (54%)	
0	18,518 (48%)	10,045 (50%)	8,473 (46%)	
Missing	6	1	5	
Birth type				0.8
Multiple	723 (1.9%)	375 (1.9%)	348 (1.9%)	
Single	37,831 (98%)	19,783 (98%)	18,048 (98%)	
Maternal smoking status at 6 months				<0.001
Nonsmoking	35,757 (93%)	19,375 (96%)	16,382 (89%)	
Smoking	2,687 (7.0%)	744 (3.7%)	1,943 (11%)	
Missing	110	39	71	
Paternal smoking status at 6 months				<0.001

Nonsmoking	21,958 (58%)	12,741 (64%)	9,217 (52%)	
Smoking	15,678 (42%)	7,102 (36%)	8,576 (48%)	
Missing	918	315	603	
Maternal educational attainment				<0.001
Junior high school	1,590 (4.8%)	534 (2.7%)	1,056 (7.8%)	
High school	15,454 (46%)	8,361 (42%)	7,093 (53%)	
University/junior college/vocational school	16,139 (48%)	10,861 (55%)	5,278 (39%)	
Others	94 (0.3%)	52 (0.3%)	42 (0.3%)	
Missing	5,277	350	4,927	
Paternal Education				<0.001
Junior high school	2,157 (6.6%)	913 (4.7%)	1,244 (9.5%)	
High school	14,921 (46%)	8,156 (42%)	6,765 (52%)	
University/junior college/vocational school	15,519 (47%)	10,443 (53%)	5,076 (39%)	
Others	105 (0.3%)	56 (0.3%)	49 (0.4%)	
Missing	5,852	590	5,262	
Daycare attendance at 6 months				<0.001
Attending	1,361 (3.5%)	596 (3.0%)	765 (4.2%)	
Not attending	37,188 (96%)	19,561 (97%)	17,627 (96%)	
Missing	5	1	4	
Household income				<0.001
<2.50 million JPY	1,758 (5.0%)	609 (3.2%)	1,149 (7.2%)	
2.50-4.99 million JPY	12,984 (37%)	6,237 (33%)	6,747 (42%)	
5.00–7.49 million JPY	12,294 (35%)	7,092 (37%)	5,202 (33%)	
7.50–9.99 million JPY	5,005 (14%)	3,187 (17%)	1,818 (11%)	
≥10.00 million JPY	2,931 (8.4%)	1,898 (10.0%)	1,033 (6.5%)	
Missing	3,582	1,135	2,447	
Feeding practice				<0.001
Exclusive breastfeeding	12,886 (34%)	7,047 (35%)	5,839 (32%)	

Exclusive formula feeding	1,345 (3.5%)	570 (2.8%)	775 (4.3%)	
Mixed feeding	23,988 (63%)	12,440 (62%)	11,548 (64%)	
Missing	335	101	234	
Asthma history (6–18 months), Presence	1,140 (3.6%)	607 (3.1%)	533 (4.2%)	<0.001
Missing	6,519	800	5,719	
Food allergy history (6–18 months), Presence	1,880 (5.9%)	1,177 (6.1%)	703 (5.5%)	0.046
Missing	6,519	800	5,719	

Data are presented as numbers (%). Differences between the included and excluded groups were assessed using the chi-square ² test.

Supplemental Table S2. Goodness-of-Fit Statistics for Group-Based Trajectory**Models of Atopic Dermatitis**

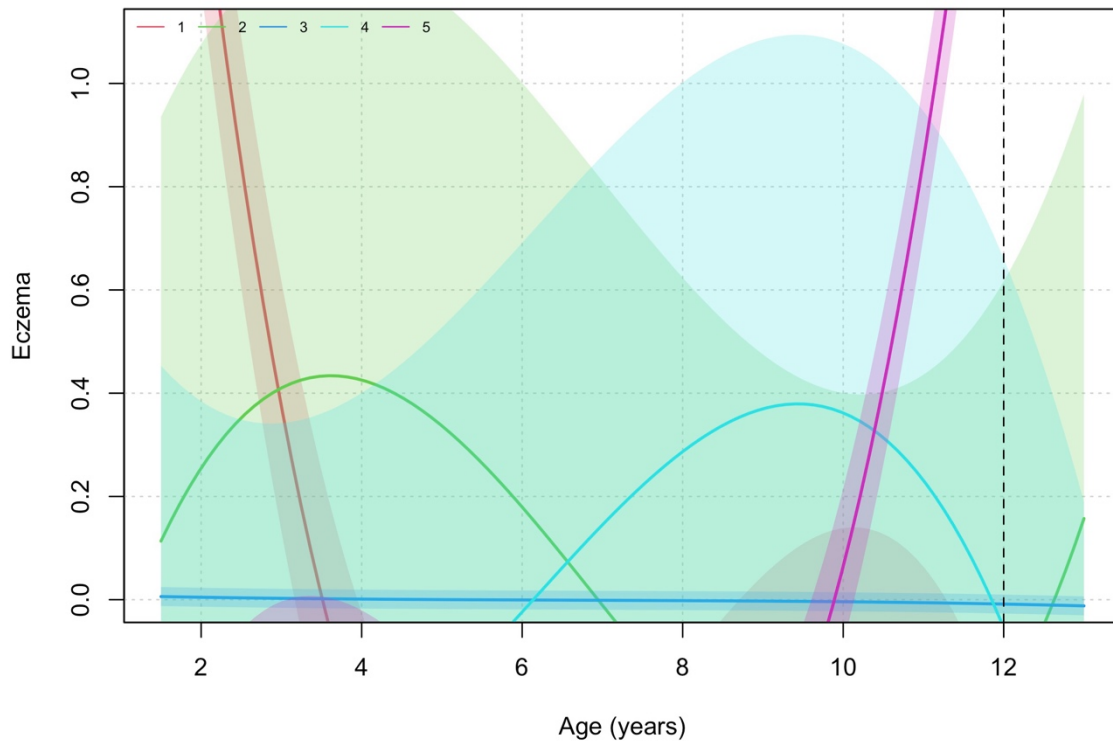
	BIC	AIC	Smallest APP
Linear			
1-cluster	511597.1	511565.7	1.00
2-cluster	-390623.4	-390696.7	1.00
3-cluster	-392536.5	-392651.7	0.8460067
4-cluster	-391535.6	-391692.7	0.5235115
5-cluster	-392504.2	-392703.2	NaN
Quadratic			
1-cluster	511411.5	511369.6	1.00
2-cluster	-410051	-410146.1	1.00
3-cluster	-415297.8	-415444.5	0.8946902
4-cluster	-417444.6	-417643.6	0.8712523
5-cluster	-417846.3	-418097.7	0.6753368
Cubic			
1-cluster	511413.5	511361.1	1.00
2-cluster	-407020.6	-407135.8	1.00
3-cluster	-419053.1	-419231.1	0.9807368
4-cluster	-420667.4	-420908.3	0.8596933
5-cluster	-421193.3	-421497.1	0.8594082

Note: The table presents goodness-of-fit statistics for models with a varying number of trajectory groups (1 to 5 clusters) and different polynomial functional forms (linear, quadratic, and cubic) for males and females separately. The optimal model was determined based on the lowest Bayesian Information Criterion (BIC) value, an average posterior probability (APP) of ≥ 0.80 for each group, sufficient group size, and clinical

interpretability. Based on these criteria, the three-group cubic polynomial model was selected as the best-fitting model for both males and females.

Abbreviations: AIC, Akaike Information Criterion; APP, Average Posterior Probability; BIC, Bayesian Information Criterion.

Figure S1. Five Identified Trajectory Phenotypes of Atopic Dermatitis



This figure illustrates the five distinct trajectory phenotypes of atopic dermatitis (AD) identified from age 1.5 to 12 years using group-based multivariate trajectory modeling. The solid lines depict the mean estimated probability for each phenotype group, while the shaded areas represent the 95% confidence intervals (CIs).

Each trajectory is characterized by its unique shape:

- Early-onset transient: High initial probability of symptoms that declines rapidly during early childhood.
- Early-onset persistent: High initial probability that remains elevated throughout early childhood before gradually declining.

- Toddler-onset persistent: Low initial probability that rises to a peak around ages 3–4 and then slowly decreases.
- Late-onset: Very low probability during early and middle childhood, followed by a sharp increase in late childhood and early adolescence.
- No/minimal symptoms: A consistently near-zero probability of symptoms throughout the entire period.

Supplementary Table S3. Prevalence of atopic dermatitis at each follow-up assessment, stratified by sex

	Male	Female
1.5 years	18.3%	16.6%
2.5 years	16.7%	16.8%
3.5 years	15.7%	15.2%
4.5 years	14.5%	14.8%
5.5 years	13.5%	13.0%
6 years	12.6%	12.6%
7 years	12.4%	12.7%
8 years	11.2%	12.0%
9 years	11.6%	12.2%
10 years	11.8%	13.1%
11 years	10.3%	12.3%

Note: Data represent the percentage of participants reporting healthcare visits for atopic dermatitis or eczema at each follow-up assessment.

Supplementary Table S4. Mean Body Mass Index z-Scores and Standard Deviations at Each Follow-up Assessment, Stratified by Sex and Atopic Dermatitis Phenotype

	Total	Early-onset transient	Early-onset persistent	Toddler- onset persistent	Late-onset	No/minimal
Male	(n = 10,377)	(n = 730)	(n = 2,449)	(n = 1,713)	(n = 207)	(n = 5,278)
1.5 years	0.23 (1.09)	0.29 (1.04)	0.23 (1.05)	0.23 (1.13)	0.02 (1.06)	0.23 (1.11)
2.5 years	0.35 (1.10)	0.38 (0.99)	0.40 (1.10)	0.33 (1.05)	0.28 (1.01)	0.33 (1.14)
3.5 years	0.21 (1.00)	0.28 (0.91)	0.22 (1.00)	0.23 (0.94)	0.09 (1.09)	0.20 (1.03)
4.5 years	0.01 (1.01)	0.05 (0.91)	0.02 (0.96)	0.02 (1.04)	-0.03 (0.93)	-0.01 (1.05)
5.5 years	-0.17 (1.06)	-0.15 (0.92)	-0.18 (1.01)	-0.15 (1.03)	-0.11 (0.87)	-0.18 (1.11)
7 years	-0.23 (1.07)	-0.23 (1.07)	-0.26 (1.12)	-0.19 (1.03)	-0.26 (0.96)	-0.23 (1.06)
8 years	-0.16 (1.10)	-0.15 (0.95)	-0.19 (1.01)	-0.13 (1.11)	-0.12 (0.94)	-0.16 (1.16)
9 years	-0.08 (1.04)	-0.08 (1.01)	-0.13 (1.05)	-0.06 (1.04)	-0.04 (0.98)	-0.06 (1.05)
10 years	0.02 (1.05)	0.00 (1.03)	-0.05 (1.07)	0.05 (1.04)	0.02 (0.99)	0.04 (1.05)
11 years	-0.05 (1.10)	-0.05 (1.02)	-0.14 (1.13)	0.00 (1.07)	0.04 (0.96)	-0.03 (1.10)
12 years	-0.09 (1.09)	-0.13 (1.10)	-0.16 (1.09)	-0.06 (1.07)	0.01 (0.97)	-0.06 (1.09)
13 years	-0.19 (1.07)	-0.19 (1.05)	-0.26 (1.06)	-0.20 (1.07)	-0.07 (1.02)	-0.16 (1.07)
Female	(n = 9,781)	(n = 598)	(n = 2,286)	(n = 1,810)	(n = 230)	(n = 4,857)
1.5 years	0.28 (1.06)	0.28 (1.08)	0.31 (1.04)	0.29 (1.03)	0.22 (1.08)	0.26 (1.09)
2.5 years	0.39 (1.08)	0.35 (1.07)	0.41 (1.07)	0.40 (1.01)	0.24 (1.09)	0.39 (1.11)
3.5 years	0.19 (0.95)	0.14 (0.95)	0.19 (0.93)	0.23 (0.88)	0.07 (1.06)	0.18 (0.99)
4.5 years	-0.01 (0.94)	-0.05 (0.97)	0.00 (0.92)	0.03 (0.90)	-0.19 (1.18)	0.00 (0.95)
5.5 years	-0.16 (0.96)	-0.17 (0.99)	-0.18 (0.96)	-0.10 (0.89)	-0.21 (0.92)	-0.18 (0.97)
7 years	-0.27 (0.97)	-0.29 (0.96)	-0.25 (0.93)	-0.20 (0.99)	-0.25 (0.88)	-0.30 (0.99)
8 years	-0.22 (0.98)	-0.25 (1.00)	-0.21 (0.98)	-0.15 (0.90)	-0.27 (0.98)	-0.24 (1.00)
9 years	-0.20 (0.97)	-0.18 (0.97)	-0.22 (0.96)	-0.14 (0.92)	-0.25 (1.05)	-0.22 (0.98)
10 years	-0.21 (1.00)	-0.26 (1.07)	-0.22 (0.99)	-0.17 (0.99)	-0.19 (1.07)	-0.20 (1.00)

11 years	-0.24 (1.00)	-0.26 (1.02)	-0.25 (0.98)	-0.21 (1.01)	-0.22 (1.06)	-0.25 (0.99)
12 years	-0.22 (1.00)	-0.30 (1.09)	-0.22 (0.97)	-0.17 (0.99)	-0.16 (1.01)	-0.23 (1.01)
13 years	-0.28 (0.98)	-0.37 (1.04)	-0.29 (0.96)	-0.22 (0.97)	-0.21 (1.01)	-0.28 (0.99)

Note: Data represent mean BMI z-scores (standard deviations) calculated using parent-reported height and weight data. BMI z-scores were converted using Japanese pediatric reference values.