# Supplement

Table S1: Individual factors and definitions.

| **Factors** | **Definition** |
| --- | --- |
| Positive skin prick test | ≥3 mm reaction, with a positive reaction to 0.1% histamine and a negative reaction to 0.9% sodium chloride. Antihistamines or glucocorticoids are withdrawn for at least 48 hours before testing. |
| Age categories |  |
| Childhood/adolescence | 6–18 years |
| Adulthood  Doctor’s diagnosis  Asthma  Allergy  Neurodermatitis | ≥19 years  Doctor’s diagnosis of asthma, interview based (questionnaire)  Doctor’s diagnosis of allergy, interview based (questionnaire)  Doctor’s diagnosis of neurodermatitis, interview based (questionnaire) |
| Respiratory symptoms |  |
| Coughing | Cough almost daily without cold in the last 12 months and/or coughing in the morning without cold in the last 12 months |
| Wheezing | Wheezing in sudden attacks and/or wheezing without cold, within last 12 months |
| Sputum production | Sputum in the last 12 months without cold, for at least one week non-stop and/or sputum in the morning in the last 12 months |
| Dyspnea | Lower walking speed and/or need to pause when walking at individual speed or after short distance/time |
| Rhinitis | Ever presence of a runny or stuffy nose without cold |
| Allergic symptoms |  |
| Rhinoconjunctivitis | Nasal itching and/or sneezing and/or runny nose and/or stuffy nose without a cold and/or itching of the eyes and/or swelling of the eyes due to an allergic reaction |
| Eczema | Swelling and/or redness and/or itching of the skin, due to an allergic reaction |
| Breathlessness | Difficulties in breathing, due to an allergic reaction |
| Lung function |  |
| Low lung function | FEV1 <LLN (lower limit of normal) following the Global Lung Initiative (GLI) guideline |
| Airflow limitation | FEV1/FVC <LLN following GLI guideline |
| Lung function reversibility | Delta FEV1 pre- vs. post-BD >12% in children/adolescents, or >12% and 200 mL in adults |
| Family history |  |
| Asthma sibling | Doctor´s diagnosis of asthma in biological siblings |
| Diagnosed parental allergy | Whether the biological father or mother suffer or have suffered from one (or more) medically diagnosed allergies |
| Environmental exposure |  |
| Maternal smoking, pregnancy | Reported maternal smoking during pregnancy |
| Maternal smoking | Reported maternal smoking during childhood/adolescence |
| Paternal smoking | Reported paternal smoking during childhood/adolescence |
| Second-hand smoking | Exposure to passive smoke ever in life for several hours on most days or nights |
| Former smoking | No smoking within the last three months  (in childhood/adolescence: smoking regularly) |
| Current smoking | In adulthood: Smoking within last three months, a minimum of 20 packs of cigarettes in life or one cigarette per day for at least one year or one cigarette per week for at least one year or 20 cigarettes per day for at least half a year or an equivalent of these in e-cigarettes  In childhood/adolescence: reported smoking regularly |
| Pets in household, current | General ownership of an animal including dogs, cats, horses, other mammals, birds, reptiles, rodents and fish |
| Dog in household | Dog in household, current |
| Cat in household | Cat in household, current |
| Residence |  |
| Urban | Home address in the city of Vienna |
| Rural | Home address in lower Austria |
| Socioeconomic status |  |
| High occupational status | Entrepreneur, employee, civil servant, freelancer |
| High educational status | Vocational training, upper secondary education, or tertiary education |
| High income status | ≥€1100 monthly equivalent household income |
| Socioeconomic status (SES) | Sum score of the three variables (occupation, education, income)  “high SES” cut off was the 80th percentile |
| Body composition |  |
| Fat mass index (FMI) | Fat mass in kg / (height in m)2 (kg/m2) |
| Low FMI | z-score ≤ –2 |
| Normal FMI | –2 < z-score < +2 |
| High FMI | z-score > +2 |
| Fat free mass index (FFMI) | Lean mass + bone mass kg / (height in m)2 (kg/m2) |
| Low FFMI | z-score ≤ –2 |
| Normal FFMI | –2 < z-score < +2 |
| High FFMI | z-score > +2 |
| Body mass index (BMI) | Total weight in kg / (height in m)2 (kg/m2) |
| Low BMI | Childhood/adolescence: z-score ≤ –2  Adulthood: <18.5 kg/m2 |
| Normal BMI | Childhood/adolescence: –2 < z-score < +2  Adulthood: 18.5–24.9 kg/m2 |
| High BMI | Childhood/adolescence: z-score > +2  Adulthood: >25 kg/m2 |

Table S2. Association of number of positive SPT reactions and symptoms and/or disease manifestation in childhood/adolescence at baseline (N = 235).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Number of positive SPT reactions** | | | **p values for comparisons** | | |
| **1  N = 195** | **2–3**  **N = 183** | **≥ 4  N = 157** | **1 vs. 2–3** | **1 vs. ≥4** | **2–3 vs. ≥4** |
| Doctor´s diagnosed asthma | 13 (7.0) | 16 (8.7) | 32 (20.4) | ns. | <0.001 | 0.003 |
| Doctor´s diagnosed neurodermatitis | 10 (5.3) | 15 (8.2) | 21 (13.5) | ns | 0.008 | ns |
| Doctor´s diagnosed allergy | 42 (22.5) | 77 (42.1) | 105 (67.3) | <0.001 | <0.001 | <0.001 |
| Eczema | 17 (9.1) | 19 (10.4) | 44 (28.0) | ns. | <0.001 | <0.001 |
| Rhinoconjunctivitis | 31 (16.6) | 77 (42.1) | 112 (71.3) | <0.001 | <0.001 | <0.001 |
| Breathlessness | 13 (6.7) | 29 (15.8) | 54 (34.4) | 0.005 | <0.001 | <0.001 |
| No symptoms | 48 (25.7) | 85 (46.4) | 122 (77.7) | <0.001 | <0.001 | <0.001 |
| Symptoms |  |  |  |  |  |  |
| Dyspnea | 3 (1.6) | 2 (1.1) | 8 (5.1) | ns | ns | ns |
| Wheezing | 12 (6.4) | 15 (8.2) | 27 (17.2) | ns | 0.001 | 0.009 |
| Coughing | 15 (8.0) | 11 (6.0) | 15 (9.6) | ns | ns | ns |
| Sputum production | 6 (3.3) | 6 (3.3) | 13 (8.3) | ns | 0.035 | 0.039 |

Data are number (%). SPT, skin prick test; ns., not significant.

Table S3. Comparison of number of positive SPT reactions and symptoms and/or disease manifestation in adulthood at baseline (N = 3711).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Number of positive SPT reactions** | | | **p values for comparisons** | | |
| **1  N = 1166** | **2–3  N = 1089** | **≥ 4  N = 1456** | **1 vs. 2–3** | **1 vs. ≥4** | **2–3 vs. ≥4** |
| Doctor´s diagnosed asthma | 92 (8.0) | 152 (14.0) | 303 (20.8) | <0.001 | <0.001 | <0.001 |
| Doctor´s diagnosed neurodermatitis | 32 (2.8) | 43 (3.9) | 82 (5.6) | ns. | <0.001 | 0.031 |
| Doctor´s diagnosed allergy | 427 (37.4) | 610 (56.2) | 1104 (75.9) | <0.001 | <0.001 | <0.001 |
| Eczema | 206 (17.9) | 242 (22.2) | 423 (29.1) | 0.007 | <0.001 | <0.001 |
| Rhinoconjunctivitis | 351 (30.6) | 588 (54.0) | 1131 (77.7) | <0.001 | <0.001 | <0.001 |
| Breathlessness | 130 (11.3) | 232 (21.3) | 504 (34.6) | <0.001 | <0.001 | <0.001 |
| No symptoms | 461 (40.2) | 668 (61.3) | 1188 (81.6) | <0.001 | <0.001 | <0.001 |
| Symptoms |  |  |  |  |  |  |
| Dyspnea | 35 (3.0) | 44 (4.0) | 41 (2.8) | ns. | ns. | ns. |
| Wheezing | 105 (9.1) | 124 (11.4) | 221 (15.2) | 0.047 | <0.001 | <0.001 |
| Coughing | 158 (13.8) | 160 (14.7) | 191 (13.1) | ns. | ns. | ns. |
| Sputum production | 133 (11.6) | 137 (12.6) | 167 (11.5) | ns. | ns. | ns. |

Data are number (%). SPT, skin prick test; ns., not significant.

Table S4. Associated factors in participants with a positive skin prick test in both age groups at baseline.

|  | **Childhood/Adolescence**  **N = 535** | **Adulthood**  **N = 3711** | **p-value** |
| --- | --- | --- | --- |
| Sex, male | 332 (62.1) | 1938 (52.2) | <0.001 |
| Urban residence | 468 (87.5) | 3104 (83.6) | 0.023 |
| Socioeconomic status |  |  |  |
| High occupational status | 405 (76.0) | 2708 (73.0) | ns |
| High educational status | 399 (75.1) | 2819 (76.1) | ns |
| High income status | 139 (74.7) | 2589 (87.8) | <0.001 |
| Socioeconomic status; category |  |  |  |
| High socioeconomic status | 213 (39.9) | 1569 (42.3) | <0.001 |
| Doctor´s diagnosed asthma | 61 (11.4) | 549 (14.8) | 0.037 |
| Doctor´s diagnosed neurodermatitis | 48 (9.0) | 158 (4.3) | <0.001 |
| Doctor´s diagnosed allergy | 228 (42.7) | 2154 (58.2) | <0.001 |
| Rhinoconjunctivitis | 224 (41.9) | 2081 (56.1) | <0.001 |
| Eczema | 84 (15.7) | 872 (23.5) | <0.001 |
| Breathlessness | 98 (18.3) | 874 (23.6) | <0.007 |
| Doctor´s diagnosed COPD/chronic bronchitis/emphysema | 8 (1.5) | 189 (5.1) | <0.001 |
| Family history |  |  |  |
| Asthma sibling | 25 (4.7) | 179 (4.8) | ns |
| Diagnosed parental allergy | 287 (53.6) | 792 (21.3) | <0.001 |
| Symptoms |  |  |  |
| Dyspnea | 13 (2.4) | 121 (3.3) | ns |
| Wheezing | 54 (10.1) | 452 (12.2) | ns |
| Coughing | 41 (7.7) | 513 (13.8) | <0.001 |
| Sputum production | 25 (4.7) | 437 (11.8) | <0.001 |
| Lung function |  |  |  |
| Low lung function | 52 (9.8) | 300 (8.1) | ns |
| Airflow limitation | 35 (6.6) | 345 (9.3) | <0.001 |
| Lung function reversibility | 37 (7.0) | 142 (3.9) | <0.001 |
| Smoking status |  |  |  |
| Former/current smoker | 38 (7.1) | 1956 (52.8) | <0.001(a,b,c,d,e,f) |
| Never smoker | 497 (92.9) | 1754 (47.3) |
| Former smoker | 3 (0.6) | 1126 (30.4) |
| Current smoker | 35 (6.5) | 830 (22.4) |
| Environmental exposure |  |  |  |
| Second-hand smoking | 113 (21.1) | 2106 (56.8) | <0.001 |
| Maternal smoking | 225 (42.5) | 808 (23.2) | <0.001 |
| Maternal smoking during pregnancy | 49 (9.2) | 136 (3.7) | <0.001 |
| Paternal smoking | 237 (44.5) | 1835 (50.2) | 0.013 |
| Pets in the household, current | 208 (38.9) | 1050 (28.3) | <0.001 |
| Dog in household, current | 72 (13.5) | 432 (11.6) | ns |
| Cat in household, current | 83 (15.5) | 547 (14.7) | ns |
| Body composition |  |  |  |
| Fat mass index; FMI |  |  |  |
| Low FMI | 4 (0.8) | 79 (2.2) | ns |
| Normal FMI | 505 (97.5) | 3364 (95.6) |
| High FMI | 9 (1.7) | 75 (2.1) |
| Lean fat mass index; LMI |  |  |  |
| Low LMI | 16 (3.1) | 87 (2.5) | ns |
| Normal LMI | 490 (94.6) | 3351 (95.3) |
| High LMI | 12 (2.3) | 80 (2.3) |
| Body mass index; BMI |  |  |  |
| Low BMI | 11 (2.1) | 78 (2.1) | <0.001(1,2,3,4,5,6) |
| Normal BMI | 479 (89.5) | 3021 (81.4) |
| High BMI | 45 (8.4) | 612 (16.5) |

Data are number (%). ns = not significant.

anever vs current or former smokers p<0.001, bnever vs former smokers p<0.001, cnever vs current smokers p<0.001, dformer vs current smokers p<0.001, ecurrent vs former or never smokers p<0.001, fformer vs current or never smokers p<0.001 with pairwise comparisons (post-hoc-tests; Fisher’s exact test); 1low vs normal BMI p=0.875, 2low vs high BMI p= 0.083, 3normal vs high BMI p=<0.001, 4low vs normal or high BMI p=1.000, 5normal vs low or high BMI p<0.001, 6high vs low or normal BMI p<0.001 with pairwise comparisons (post-hoc-tests; Fisher’s exact test)

Table S5. Factors potentially associated with positive skin prick test at baseline.

|  | **Childhood/Adolescence**  **N = 1439** | | **Adulthood**  **N = 9844** | |
| --- | --- | --- | --- | --- |
| **Negative SPT**  **N = 904** | **Positive SPT**  **N = 535** | **Negative SPT**  **N = 6133** | **Positive SPT**  **N = 3711** |
| Sex, male | 442 (48.9) | 332 (62.1)\* | 2649 (43.2) | 1938 (52.2)\* |
| Urban residence | 810 (89.6) | 468 (87.5) | 5115 (83.4) | 3104 (83.6) |
| Socioeconomic status |  |  |  |  |
| High occupational status | 677 (75.1) | 405 (76.0) | 4652 (75.9) | 2708 (73.0)\* |
| High educational status | 649 (72.4) | 399 (75.1) | 4118 (67.2) | 2819 (76.1)\* |
| High income status | 249 (64.5) | 139 (74.7)\* | 4220 (85.5) | 2589 (87.8)\* |
| Socioeconomic status, category |  |  |  |  |
| High socioeconomic status | 350 (38.8) | 213 (39.9) | 2036 (33.2) | 1569 (42.3)\* |
| Doctor`s diagnosis |  |  |  |  |
| Allergy | 54 (6.0) | 228 (25.2)\* | 947 (15.4) | 2154 (58.0)\* |
| Asthma | 15 (1.7) | 61 (11.4)\* | 246 (4.0) | 549 (14.8)\* |
| COPD/chronic bronchitis/emphysema | 15 (1.7) | 8 (1.5) | 353 (5.8) | 189 (5.1) |
| Family history |  |  |  |  |
| Asthma sibling | 31 (3.4) | 25 (4.7) | 222 (3.6) | 179 (4.8)\* |
| Diagnosed parental allergy | 358 (39.6) | 287 (53.6)\* | 765 (11.0) | 792 (21.3)\* |
| Symptoms |  |  |  |  |
| Dyspnea | 12 (1.3) | 13 (2.4) | 277 (4.5) | 121 (3.3)\* |
| Wheezing | 30 (3.3) | 54 (10.1)\* | 554 (9.0) | 452 (12.2)\* |
| Coughing | 45 (5.0) | 41 (7.7)\* | 900 (14.7) | 513 (13.8) |
| Sputum production | 22 (2.4) | 25 (4.7)\* | 704 (11.5) | 437 (11.8) |
| Rhinitis | 124 (13.7) | 255 (47.7)\* | 1514 (24.7) | 2383 (64.2)\* |
| Lung function |  |  |  |  |
| Low lung function | 53 (5.9) | 52 (9.8)\* | 449 (7.3) | 300 (8.1) |
| Airflow limitation | 45 (5.0) | 35 (6.6) | 441 (7.2) | 345 (9.3)\* |
| Smoking status |  |  |  |  |
| Former/current smoker | 33 (3.7) | 38 (7.1)\* |  |  |
| Never smoker |  |  | 2553 (41.6) | 1754 (47.3) |
| Former smoker |  |  | 2063 (33.6) | 1126 (30.4)\*(†,‡,§) |
| Current smoker |  |  | 1515 (24.7) | 830 (22.4) |
| Environmental exposure |  |  |  |  |
| Second-hand smoking | 178 (19.7) | 113 (21.1) | 3905 (63.8) | 2106 (56.8)\* |
| Maternal smoking | 387 (43.5) | 225 (42.5) | 1077 (18.9) | 808 (23.2)\* |
| Maternal smoking during pregnancy | 104 (11.5) | 49 (9.2) | 236 (3.8) | 136 (3.7) |
| Paternal smoking | 429 (47.7) | 237 (44.5) | 3250 (54.2) | 1835 (50.2)\* |
| Pets in the household | 415 (45.9) | 208 (38.9)\* | 1928 (31.4) | 1050 (28.3)\* |
| Dog in household | 158 (17.5) | 72 (13.5)\* | 833 (13.6) | 432 (11.6)\* |
| Cat in household | 191 (21.1) | 83 (15.5)\* | 1050 (17.1) | 547 (14.7)\* |
| Body composition |  |  |  |  |
| Fat mass index (FMI) |  |  |  |  |
| Low FMI | 11 (1.3) | 4 (0.8) | 131 (2.2) | 79 (2.2) |
| Normal FMI | 838 (97.6) | 505 (97.5) | 5586 (95.2) | 3364 (95.6) |
| High FMI | 10 (1.2) | 9 (1.7) | 151 (2.6) | 75 (2.1) |
| Fat free mass index (FFMI) |  |  |  |  |
| Low FFMI | 213 (23.7) | 139 (26.1) | 1485 (24.3) | 957 (25.9) |
| Normal FFMI | 436 (48.6) | 278 (52.3) | 3052 (50.0) | 1853 (50.1) |
| High FFMI | 248 (27.6) | 115 (21.6) | 1567 (25.7) | 887 (24.) |
| Body mass index (BMI) |  |  |  |  |
| Low BMI | 19 (2.1) | 9 (1.7) | 124 (2.0) | 78 (2.1) |
| Normal BMI | 810 (89.6) | 484 (90.5) | 4792 (78.1) | 3021 (81.4)\*(a,b,c) |
| High BMI | 75 (8.3) | 42 (7.9) | 1217 (19.8) | 612 (16.5) |

Data are number (%). COPD= chronic obstructive pulmonary disease.

\*positive vs. negative skin prick test p<0.05; †never vs. former smoker p<0.001, ‡former vs. current smoker p=0.485, and §never vs. current smoker p<0.001 with pairwise comparisons (post-hoc-tests; Fisher’s exact test); alow vs. normal p=0.525, bnormal vs. high p<0.001, and clow vs. high p=0.083 with pairwise comparisons (post-hoc-tests; Fisher’s exact test).