Supplementary Online Content

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eReferences.

This supplementary material has been provided by the authors to give readers additional information about their work.
### eTable 1. List of *International Classification of Diseases (ICD)* Codes to Collect Records of Primary Humoral Immunodeficiencies From the National Patient Register

| Diagnoses                                                                 | ICD-8 codes | ICD-9 codes | ICD-10 codes | PID n=8 378 (%)^b |
|---------------------------------------------------------------------------|-------------|-------------|--------------|-------------------|
| Hypogammaglobulinaemia                                                   | 275,10^a    |             |              | 744 (8.88)        |
| **Primary deficiencies of humoral immunity**                             |             | 279J^a      |              | 1 469 (17.53)     |
| Agammaglobulinemia                                                       |             | D80.0       |              | 2 244 (26.78)     |
| Hypogammaglobulinemia                                                    |             |             | D80.1        | 3 519 (42.00)     |
| Common variable immunodeficiency                                          |             | D80.2       |              | 4 050 (48.34)     |
| Selective deficiency of immunoglobulin A                                  |             | D80.3       |              | 4 786 (57.13)     |
| Selective deficiency of immunoglobulin G                                  |             | D80.4       |              | 2 096 (25.02)     |
| Hereditary hypogammaglobulinemia                                          |             | D80.5       |              | 57 (0.68)         |
| Nonfamilial hypogammaglobulinemia                                        |             | D83.0       |              | 2 317 (27.66)     |
| Selective deficiency of immunoglobulin G subclasses                       |             | D83.1       |              | 139 (1.66)        |
| Selective deficiency of immunoglobulin M                                 |             | D83.2       |              | 2 037 (24.31)     |
| Immunodeficiency with increased immunoglobulin M                          |             | D83.3       |              | 2 130 (25.42)     |
| Common variable immunodeficiency with predominant abnormalities of B-cell numbers and function |             | D83.4       |              | 2 405 (28.71)     |
| Common variable immunodeficiency with predominant immunoregulatory T-cell disorders |             |             |              |                  |
| Common variable immunodeficiency with autoantibodies to B- or T-cells    |             |             |              |                  |
| Other common variable immunodeficiency                                    |             |             |              |                  |
| Common variable immunodeficiency, unspecified                            |             |             |              |                  |

^a In ICD-8 and 9 there was only one diagnostic code representing primary deficiencies of humoral immunity.

^b Individual ICD-codes for subtypes of primary immunodeficiency (PID) could only be ascertained in ICD-10. The sum of individuals with a specific PID diagnosis may exceed the total number of PID individuals since patients could have more than one code in the register.
## eTable 2. List of *International Classification of Diseases (ICD)* Codes to Collect Records of Autoimmune Diseases From the National Patient Register

| Diagnoses                                          | ICD-8 codes | ICD-9 codes | ICD-10 codes |
|----------------------------------------------------|-------------|-------------|--------------|
| Acute disseminated encephalomyelitis                | -           | -           | G04          |
| Alopecia areata                                     | 704.00      | 704.A       | L63          |
| Anti-NMDA receptor encephalitis                     | -           | -           | G13.1        |
| Antiphospholipid syndrome                           | -           | -           | D68.61       |
| Autoimmune polyglandular syndrome                   | 258.10      | 258.B       | E31.0        |
| Behçet's disease                                    | 136.07      | 136.B       | M35.2        |
| Bullous pemphigoid                                  | 694.02      | 694.F       | L12.0        |
| Celiac disease                                      | 269.10      | 579.A       | K90.0        |
| Churg-Strauss syndrome                              | -           | -           | M30.1        |
| Crohn's disease                                     | 563.00      | 555         | K50          |
| Dermatomyositis                                     | 716.00      | 710.D       | M33.90       |
| Graves' disease                                     | 242.00      | 242.A       | E05.0        |
| Guillain-Barré syndrome                             | 354.01      | 357.A       | G61.0        |
| Hashimoto's thyroiditis                             | 245.03      | 245.C       | E06.3        |
| Henoch-Schonlein purpura                            | 287.00      | 287.A       | D69.0        |
| Idiopathic thrombocytopenic purpura                 | 287.10 / 446.38 | 287.D | D69.3        |
| IgA nephropathy                                     | 580 /582    | 580 /582    | N00/N01/N03/N05 |
| Kawasaki                                            | -           | -           | M30.3        |
| Microscopic polyangiitis                            | -           | -           | M31.7        |
| Mixed connective tissue disease                     | 734.91      | 710.W       | M35.1        |
| Multiple sclerosis                                  | 340         | 340         | G35          |
| Myasthenia gravis                                   | 733.00      | 358.A       | G70.0        |
| Pemphigus vulgaris                                  | 694         | 694.E       | L10.0        |
| Polymyalgia rheumatica                              | -           | 725         | M35.3        |
| Polymyositis                                        | 446.09      | 446.0       | M30.0        |
| Primary biliary cirrhosis                           | 571.90      | 571.F       | K74.3        |
| Psoriasis vulgaris                                  | 696.10 / 696.19-23 | 696   | L40          |
| Rheumatic fever                                     | 390/391     | 390/391     | I00/I01      |
| Rheumatic fever with chorea                         | 392         | 392         | I02          |
| Rheumatoid arthritis                                | 712.00 / 712.10/ 712.19 / 712.39 / 712.59 | 714.A | M06          |
| Scarlet fever                                       | 034.1       | 034.1       | A38.9        |
| Scleroderma (systemic sclerosis)                    | 734.0 / 734.01 / 734.09 | 710.B | M34          |
| Sjögren's syndrome                                  | 734.90      | 710.C       | M35.0        |
| Systemic Lupus Erythematosus                        | 734.10      | 710.A       | M32          |
| Temporal arteritis                                  | 446.30      | 446.F       | M31.5        |
| Thrombotic thrombocytopenic purpura                 | 446.40      | 446.G       | M31.1        |
| Type 1 diabetes mellitus                            | -           | -           | E10.9        |
| Ulcerative colitis                                  | 563.10      | 556         | K51          |
| Vitiligo                                            | 709.05      | 709.A       | L80          |
| Wegener's granulomatosis                            | 446.20      | 446.E       | M31.3        |
**Table 3.** List of Swedish *International Classification of Diseases (ICD)* Codes to Collect Records of Psychiatric Disorders From the National Patient Register

| Diagnoses                                      | ICD-8 codes | ICD-9 codes | ICD-10 codes | Age constraints                                                                 | Median age (IQR) of first record of diagnosis in the registers, years |
|------------------------------------------------|-------------|-------------|--------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Autism spectrum disorders                      | -           | 299A        | F84.0, F84.1, F84.8, F84.9 | If recorded at age ≥1 year                                                       | 16.39 (10.21-26.06)                                                   |
| Attention-deficit/hyperactivity disorder        | -           | 314W, 314X  | F90          | Prescribed Drug Register codes: a N06BA01, N06BA02, N06BA04, N06BA09, N06BA12 | If recorded at age ≥3 years                                              | 17.29 (11.60-29.12)                                                   |
| Tourette’s and chronic tic disorders            | 306.2       | 307C        | F95.1, F95.2  | Following the algorithm described elsewhere.²                                  | 13.90 (10.36-22.41)                                                   |
| Obsessive-compulsive disorder                   | 300.3       | 300D        | F42          | If recorded at age 6 years or above                                             | 28.92 (20.13-41.67)                                                   |

*Prescribed Drug Register codes: a N06BA01, N06BA02, N06BA04, N06BA09, N06BA12*
| Eating disorders       | -   | 307B, 307F | F50.0/.1/.2/.3/.8/.9 | If recorded at age ≥8 years | 19.80 (16.24-26.44) |
|-----------------------|-----|------------|---------------------|------------------------------|---------------------|
| Schizophrenia and other psychotic disorders | 291, 295, 296.99, 297, 298, 299 | 291, 292, 295, 296X, 297, 298, 299 (except for 299A) | F10-F19 subsection .5, F20, F21, F22, F23, F24, F25, F28, F29, F32.3 | If recorded at age ≥10 years | 50.60 (33.75-70.44) |
| Bipolar disorder      | 296, except 296.2 and 296.99 | 296, except 296B and 296X | F30, F31 | If recorded at age ≥10 years | 44.70 (31.04-59.78) |
| Anxiety disorders     | 3000, 3002 | 300A, 300C, 308,309 | F40.0, F40.1, F41.1 | If recorded at age ≥6 years | 38.63 (25.57-53.27) |
| Major depression disorder and other mood disorders | 296.2, 300.4 | 296B, 300E, 311 | F32 (except for F32.3), F33, F34, F38, F39 | If recorded at age ≥10 years | 45.87 (30.13-64.66) |
| Substance use disorders | 303, 304 | 303, 304, 305A, 305X | F10-F19 (except subsection .5) | If recorded at age ≥10 years | 41.92 (26.32-56.63) |

* In the Prescribed Drug Register, drug classes are defined following the Anatomical Therapeutic Chemical (ATC) classification system codes.
Abbreviation: IQR, Interquartile range
### Table 4. List of *International Classification of Diseases (ICD)* Codes to Define Suicidal Behavior From the National Patient Register and the Cause of Death Register

| Diagnoses                                      | ICD codesa                                      | Median age (IQR) of first record of diagnosis in the registers, years |
|------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|
| Suicide and self-inflicted injury              | E950-E959 (ICD-8 and ICD-9), if recorded at age ≥10 years | Deaths by suicide: 51.29 (37.22-64.46)                                      |
|                                                |                                                  | Suicide attempts: 34.42 (22.12-51.13)                                    |
| Intentional self-harm                          | X60-X84 (ICD-10), if recorded at age ≥10 years   |                                                                       |
| Injury undetermined whether accidental or purposely inflicted | E980-E989 (ICD-8 and ICD-9), if recorded at age ≥10 years |                                                                       |
| Events of undetermined intent                  | Y10-Y34 (ICD-10), if recorded at age ≥10 years   |                                                                       |

a Diagnoses of suicide attempts were retrieved from the National Patient Register and were coded according to the Swedish version of ICD-codes in its 8th, 9th, or 10th revision.

b Diagnoses of death by suicide were retrieved from the Cause of Death Register using the same codes as for suicide attempts and were coded according to the International version of ICD-codes in its 8th, 9th, or 10th revision.

c Consistent with previous suicide research, both certain and undetermined causes were included in the definition of suicidal behavior.3,4

Abbreviation: IQR, Interquartile range
**Table 5.** Associations Between Exposure to Selective IgA Deficiency and Psychiatric Disorders and Suicidal Behavior in the Population Cohort and in the Full-Siblings Subcohort

|                              | Population cohort |          | Full siblings cohort |          |
|------------------------------|-------------------|----------|----------------------|----------|
|                              | No. (%)           | OR (95% CI) | Minimally adjusted   | Fully adjusted   |
| Exposed (n=3 132)            | 1 308 053 (11.28) | 2.03 (1.86-2.21)** | 1.79 (1.64-1.95)*** |
| Unexposed (n=11 593 012)     |                   |           |                      |                      |
| Any psychiatric disorderd    | 644 (20.62)       |           |                      |                      |
|                              | 1 171 743 (9.13)  | 2.04 (1.87-2.23)** | 1.77 (1.64-1.95)*** |
|                              |                   |           |                      |                      |
| Autism spectrum disorders    | 49 (1.57)         | 3.88 (2.92-5.16)** | 3.27 (2.46-4.35)*** |
|                              |                   |           |                      |                      |
| Attention-deficit/hyperactivity disorder | 63 (2.02) | 1.95 (1.52-2.51)*** | 1.65 (1.28-2.13)*** |
|                              |                   |           |                      |                      |
| Eating disorders             | 23 (0.74)         | 2.18 (1.45-3.29)** | 1.81 (1.20-2.73)**  |
|                              |                   |           |                      |                      |
| Schizophrenia and other psychotic disorders | 69 (2.21) | 1.62 (1.28-2.06)*** | 1.53 (1.20-1.94)*** |
|                              |                   |           |                      |                      |
| Bipolar disorder             | 39 (1.25)         | 1.90 (1.38-2.60)*** | 1.67 (1.22-2.30)**  |
|                              |                   |           |                      |                      |
| Anxiety disorders            | 299 (9.57)        | 2.23 (1.98-2.51)*** | 1.95 (1.73-2.20)*** |
|                              |                   |           |                      |                      |
| Major depression disorder and other mood disorders | 310 (9.93) | 2.14 (1.90-2.40)*** | 1.85 (1.64-2.08)*** |
|                              |                   |           |                      |                      |
| Substance use disorders      | 433 036 (3.74)    | 1.62 (1.39-1.89)*** | 1.42 (1.22-1.66)*** |
|                              |                   |           |                      |                      |
| Any suicidal behaviord       | 128 (4.10)        | 1.63 (1.37-1.95)*** | 1.45 (1.22-1.73)*** |
|                              |                   |           |                      |                      |
| Death by suicide             | 12 (0.38)         | 1.96 (1.11-3.46)* | 2.02 (1.14-3.56)* |
|                              |                   |           |                      |                      |
| Suicide attempt              | 121 (3.87)        | 1.63 (1.36-1.96)*** | 1.43 (1.20-1.72)*** |

*Significant ORs are marked in bold. Tourette syndrome or chronic tic disorders are not reported as a separate entity due to underpowered analysis.

* Adjusted for individual’s year of birth and sex.

** Adjusted additionally for history of autoimmune disease.

** Adjusted for year of birth and sex on both exposed and unexposed siblings.

d Total numbers and percentage of the specific outcomes may not sum up to that of the combined outcomes as the study participants may have more than one specific outcome.

* p<0.05, ** p<0.01, *** p<0.001

Abbreviation: OR, odds ratio; CI, confidence intervals.
**Table 6.** Associations of Primary Immunodeficiencies With Psychiatric Disorders and Suicidal Behavior in the Population Cohort Stratified by Sex

|                          | Population cohort                                                                 | OR (95% CI)                                                                 |
|--------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------|
|                          | Exposed (n=3 431) Unexposed (n=7 219 283)                                       | Minimally adjusted<sup>a</sup> Fully adjusted OR<sup>b</sup>                |
| **Any psychiatric disorder** |                                                                                  |                                                                            |
| Men                      | 569 (16.58) 753 763 (10.44)                                                     | 1.73 (1.58-1.89)<sup>***</sup> 1.54 (1.41-1.68)<sup>***</sup>               |
| Women                    | 1 151 (23.27) 770 974 (10.89)                                                   | 2.48 (2.32-2.65)<sup>***</sup> 2.18 (2.04-2.33)<sup>***</sup>               |
| **Autism spectrum disorders** |                                                                                  |                                                                            |
| Men                      | 61 (1.78) 36 517 (0.51)                                                        | 3.71 (2.87-4.79)<sup>***</sup> 3.20 (2.47-4.13)<sup>***</sup>               |
| Women                    | 28 (0.57) 17 351 (0.25)                                                        | 3.05 (2.10-4.43)<sup>***</sup> 2.58 (1.78-3.75)<sup>***</sup>               |
| **Attention-deficit/hyperactivity disorder** |                                                                                  |                                                                            |
| Men                      | 68 (1.98) 73 260 (1.01)                                                        | 2.04 (1.60-2.61)<sup>***</sup> 1.79 (1.41-2.29)<sup>***</sup>               |
| Women                    | 58 (1.17) 41 453 (0.59)                                                        | 2.62 (2.02-3.40)<sup>***</sup> 2.22 (1.71-2.88)<sup>***</sup>               |
| **Obsessive-compulsive disorder** |                                                                                  |                                                                            |
| Men                      | 21 (0.61) 16 399 (0.23)                                                        | 2.65 (1.73-4.08)<sup>***</sup> 2.37 (1.54-3.64)<sup>***</sup>               |
| Women                    | 33 (0.67) 21 335 (0.30)                                                        | 2.41 (1.71-3.39)<sup>***</sup> 2.10 (1.49-2.96)<sup>***</sup>               |
| **Eating disorders**     |                                                                                  |                                                                            |
| Men                      | 5 (0.15) 3 163 (0.04)                                                          | 3.29 (1.37-7.90)<sup>**</sup> 2.76 (1.15-6.65)<sup>*</sup>                  |
| Women                    | 65 (1.31) 37 108 (0.52)                                                        | 3.03 (2.57-3.88)<sup>***</sup> 2.53 (1.98-3.24)<sup>***</sup>               |
| **Schizophrenia and other psychotic disorders** |                                                                                  |                                                                            |
| Men                      | 74 (2.16) 141 710 (1.96)                                                       | 1.21 (0.96-1.53) 1.15 (0.91-1.45)                                          |
| Women                    | 130 (2.63) 129 019 (1.82)                                                      | 1.58 (1.33-1.88)<sup>***</sup> 1.49 (1.25-1.78)<sup>***</sup>               |
| **Bipolar disorder**     |                                                                                  |                                                                            |
| Disorder                                      | Men                  | Women                | Adjusted OR (95% CI) | p-value |
|----------------------------------------------|----------------------|----------------------|----------------------|---------|
| Anxiety disorders                            |                      |                      |                      |         |
| Men                                          | 24 (0.70)            | 34 740 (0.48)        | **1.50 (1.01-2.24)** | *0.05   |
| Women                                         | 76 (1.54)            | 54 254 (0.77)        | **2.02 (1.61-2.53)** | ***0.001|
| Major depression disorder and other mood disorders |                      |                      |                      |         |
| Men                                          | 201 (5.86)           | 202 483 (2.80)       | **2.12 (1.84-2.45)** | ***0.001|
| Women                                         | 576 (11.64)          | 320 441 (4.53)       | **2.89 (2.65-3.15)** | ***0.001|
| Substance use disorders                       |                      |                      |                      |         |
| Men                                          | 229 (6.67)           | 244 679 (3.39)       | **2.08 (1.82-2.38)** | ***0.001|
| Women                                         | 64 (12.96)           | 381 030 (5.38)       | **2.62 (2.41-2.85)** | ***0.001|
| Any suicidal behavior                         |                      |                      |                      |         |
| Men                                          | 106 (3.09)           | 163 058 (2.26)       | **1.38 (1.14-1.68)** | **0.01**|
| Women                                         | 293 (5.92)           | 169 377 (2.39)       | **2.58 (2.29-2.90)** | ***0.001|
| Death by suicide                              |                      |                      |                      |         |
| Men                                          | 8 (0.23)             | 17 996 (0.25)        | 0.95 (0.47-1.90)     | 0.93    |
| Women                                         | 18 (0.36)            | 7 539 (0.11)         | **3.44 (2.16-5.45)** | ***0.001|
| Suicide attempt                               |                      |                      |                      |         |
| Men                                          | 99 (2.89)            | 149 491 (2.07)       | **1.41 (1.15-1.72)** | **0.01**|
| Women                                         | 283 (5.72)           | 164 974 (2.33)       | **2.57 (2.28-2.89)** | ***0.001|

Note: Significant ORs are marked in bold. Tourette syndrome or chronic tic disorders are not reported as a separate entity due to underpowered analysis.
a Adjusted for individual’s year of birth and sex.
b Additionally adjusted for history of autoimmune disease.
* p<0.05, ** p<0.01, *** p<0.001
### Table 7. Associations of Exposure to Primary Immunodeficiencies Only, Autoimmune Diseases Only, and Joint Exposure to Primary Immunodeficiency and Autoimmune Diseases With Psychiatric Disorders and Suicidal Behavior in the Population Cohort Stratified by Sex

|                          | PID only | AD only | PID and AD | Neither PID or AD |
|--------------------------|----------|---------|------------|-------------------|
|                          | Men n=2 606 | Women n=3 463 | Men n=413 686 | Women n=553 878 | Men n=825 | Women n=1 484 | Men n=6 805 387 | Women n=6 524 776 |
| **No. (%)**              | OR (95% CI) | No. (%) | OR (95% CI) | No. (%) | OR (95% CI) | No. (%) | OR (95% CI) |
| **Any psychiatric disorder** |          |        |            |          |            |        |        |
| Men                      | 404 (15.50) | 68 257 (16.49) | 1.65 (1.48-1.84)*** | 165 (20.00) | 2.25 (1.90-2.67)*** | 685 506 (10.07) |
| Women                    | 760 (21.95) | 93 773 (16.93) | 2.42 (2.24-2.63)*** | 391 (26.35) | 3.08 (2.75-3.46)*** | 677 201 (10.38) |
| **Autism spectrum disorders** |          |        |            |          |            |        |        |
| Men                      | 45 (1.73) | 2 327 (0.56) | 3.65 (2.71-4.91)*** | 16 (1.94) | 4.46 (2.71-7.35)*** | 34 190 (0.50) |
| Women                    | 19 (0.55) | 1 481 (0.27) | 3.04 (1.93-4.78)*** | 9 (0.61) | 3.66 (1.89-7.05)*** | 15 870 (0.24) |
| **Attention-deficit/hyperactivity disorder** |          |        |            |          |            |        |        |
| Men                      | 55 (2.11) | 4 407 (1.06) | 2.21 (1.68-2.89)*** | 13 (1.58) | 1.76 (1.01-3.06)* | 68 853 (1.01) |
| Women                    | 38 (1.10) | 3 604 (0.65) | 2.53 (1.83-3.48)*** | 20 (1.35) | 3.37 (2.16-5.25)*** | 37 849 (0.58) |
| **Obsessive-compulsive disorder** |          |        |            |          |            |        |        |
| Men                      | 16 (0.61) | 1 279 (0.31) | 2.74 (1.67-4.47)*** | 5 (0.61) | 2.75 (1.14-6.62)* | 15 120 (0.22) |
| Women                    | 27 (0.78) | 2 230 (0.40) | 2.93 (2.01-4.28)*** | 6 (0.40) | 1.55 (0.69-3.45) | 19 105 (0.29) |
| **Eating disorders**     |          |        |            |          |            |        |        |
| Men                      | 4 (0.15) | 283 (0.07) | 3.59 (1.35-9.59)* | 1 (0.12) | 2.91 (0.41-20.7) | 2 880 (0.04) |
| Women                    | 40 (1.16) | 3 734 (0.67) | 2.78 (2.04-3.81)*** | 25 (1.68) | 4.33 (2.91-6.43)*** | 33 374 (0.51) |
| **Schizophrenia and other psychotic disorders** |          |        |            |          |            |        |        |
| Men                      | 58 (2.23) | 11 440 (2.76) | 1.28 (0.98-1.66) | 16 (1.94) | 1.12 (0.68-1.84) | 130 270 (1.91) |
| Women                    | 82 (2.37) | 13 962 (2.52) | 1.45 (1.17-1.81)*** | 48 (3.23) | 2.02 (1.51-2.69)*** | 115 057 (1.76) |

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| Disorder                                      | Gender | N (%) | OR (CI)                      | N (%) | OR (CI)                      |
|----------------------------------------------|--------|-------|------------------------------|-------|------------------------------|
| **Bipolar disorder**                         |        |       |                              |       |                              |
| Men                                          | 17 (0.65) | 1.45 (0.90-2.34) | 3 428 (0.83) | 1.73 (1.67-1.79)** | 7 (0.85) | 1.89 (0.90-3.99) | 31 312 (0.46) |
| Women                                        | 50 (1.44) | **1.99 (1.50-2.63)*** | 6 716 (1.21) | **1.62 (1.58-1.66)*** | 26 (1.75) | **2.43 (1.65-3.57)*** | 47 538 (0.73) |
| **Anxiety disorders**                        |        |       |                              |       |                              |
| Men                                          | 138 (5.30) | **1.99 (1.68-2.37)*** | 19 266 (4.65) | **1.94 (1.91-1.97)*** | 63 (7.64) | **3.00 (2.32-3.88)*** | 183 217 (2.69) |
| Women                                        | 379 (10.94) | **2.84 (2.55-3.16)*** | 38 619 (6.97) | **1.87 (1.85-1.89)*** | 197 (13.27) | **3.58 (3.08-4.16)*** | 281 822 (4.32) |
| **Major depression disorder and other mood disorders** |        |       |                              |       |                              |
| Men                                          | 146 (5.60) | **1.82 (1.54-2.16)*** | 26 662 (6.44) | **2.01 (1.98-2.03)*** | 83 (10.06) | **3.44 (2.74-4.32)*** | 218 017 (3.20) |
| Women                                        | 398 (11.49) | **2.44 (2.19-2.70)*** | 51 979 (9.38) | **1.88 (1.86-1.90)*** | 243 (16.37) | **3.67 (3.20-4.21)*** | 329 051 (5.04) |
| **Substance use disorders**                  |        |       |                              |       |                              |
| Men                                          | 157 (6.02) | **1.34 (1.14-1.58)*** | 33 654 (8.13) | **1.73 (1.71-1.75)*** | 45 (5.45) | **1.21 (0.89-1.63) | 316 945 (4.66) |
| Women                                        | 203 (5.86) | **2.67 (2.32-3.08)*** | 22 397 (4.04) | **1.86 (1.83-1.89)*** | 105 (7.08) | **3.28 (2.69-4.00)*** | 149 985 (2.30) |
| **Any suicidal behavior**                    |        |       |                              |       |                              |
| Men                                          | 79 (3.03) | **1.40 (1.12-1.76)*** | 14 801 (3.58) | **1.66 (1.64-1.69)*** | 27 (3.27) | **1.52 (1.04-2.23)* | 148 257 (2.18) |
| Women                                        | 184 (5.31) | **2.43 (2.09-2.82)*** | 21 046 (4.30) | **1.75 (1.72-1.77)*** | 109 (7.35) | **3.44 (2.83-4.18)*** | 148 331 (2.27) |
| **Death by suicide**                         |        |       |                              |       |                              |
| Men                                          | 5 (0.19) | 0.79 (0.33-1.89) | 1187 (0.29) | **1.13 (1.06-1.20)*** | 3 (0.36) | **1.50 (0.48-4.65) | 16 809 (0.25) |
| Women                                        | 14 (0.40) | **3.87 (2.29-6.54)*** | 724 (0.13) | **1.22 (1.13-1.32)*** | 4 (0.27) | **2.57 (0.96-6.86) | 6 815 (0.10) |
| **Suicide attempt**                          |        |       |                              |       |                              |
| Men                                          | 74 (2.84) | **1.44 (1.14-1.81)*** | 13974 (3.38) | **1.73 (1.70-1.76)*** | 25 (3.03) | **1.54 (1.03-2.29)* | 135 517 (1.99) |
| Women                                        | 178 (5.14) | **2.41 (2.08-2.81)*** | 20663 (3.73) | **1.77 (1.74-1.79)*** | 105 (7.08) | **3.40 (2.79-4.15)*** | 144 311 (2.21) |

Note: Significant ORs are marked in bold. Tourette syndrome or chronic tic disorders are not reported as a separate entity due to underpowered analysis.
AD autoimmune disease; PID primary immunodeficiency.
* p<0.05, ** p<0.01, *** p<0.001

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**Table 8.** Associations Between Exposure to Primary Immunodeficiencies and Psychiatric Disorders and Suicidal Behavior in the Population Cohort and Full Sibling Subcohort, After Excluding Individuals Who Received Their Exposure and/or Outcome Diagnoses Before 2001

| Population cohort | Full siblings cohort |
|-------------------|----------------------|
|                   | No. (%)               | OR (95% CI) | No. (%)               | OR (95% CI) |
|                   | Exposed (n=5 440)     | Unexposed (n= 10 642 431) | Minimally adjusted<sup>a</sup> | Fully adjusted<sup>b</sup> |
|                   | Exposed (n=3 452)     | Unexposed (n= 7 708) | Minimally adjusted<sup>c</sup> | Fully adjusted<sup>b</sup> |
| Any psychiatric disorder<sup>d</sup> | 878 (16.14) | 888 878 (8.35) | 2.08 (1.94-2.24)<sup>***</sup> | 1.88 (1.75-2.02)<sup>***</sup> | 545 (15.79) | 789 (10.24) | 1.70 (1.47-1.96)<sup>***</sup> | 1.64 (1.42-1.90)<sup>***</sup> |
| Autism spectrum disorders | 59 (1.08) | 47 299 (0.44) | 3.18 (2.46-4.12)<sup>***</sup> | 2.75 (2.13-3.57)<sup>***</sup> | 44 (1.27) | 44 (0.57) | 2.14 (1.24-3.69)<sup>***</sup> | 2.13 (1.20-3.78)<sup>***</sup> |
| Attention-deficit/hyperactivity disorder | 86 (1.58) | 102 972 (0.97) | 2.10 (1.70-2.61)<sup>***</sup> | 1.86 (1.50-2.30)<sup>***</sup> | 54 (1.56) | 81 (1.05) | 1.48 (0.96-2.28) | 1.50 (0.95-2.35) |
| Obsessive-compulsive disorder | 30 (0.55) | 27 478 (0.26) | 2.31 (1.62-3.31)<sup>***</sup> | 2.09 (1.46-2.99)<sup>***</sup> | 20 (0.58) | 26 (0.34) | 1.48 (0.72-3.06) | 1.63 (0.77-3.47) |
| Eating disorders | 21 (0.39) | 29 384 (0.28) | 1.53 (1.00-2.36) | 1.30 (0.85-2.01) | 15 (0.43) | 25 (0.32) | 0.72 (0.32-1.64) | 0.57 (0.22-1.48) |
| Schizophrenia and other psychotic disorders | 33 (0.61) | 52 019 (0.49) | 1.21 (0.86-1.71) | 1.15 (0.81-1.61) | 19 (0.55) | 51 (0.66) | 0.76 (0.42-1.38) | 0.82 (0.44-1.54) |
| Bipolar disorder | 31 (0.57) | 37 031 (0.35) | 1.60 (1.12-2.28)<sup>**</sup> | 1.46 (1.03-2.08)<sup>*</sup> | 16 (0.46) | 41 (0.53) | 1.04 (0.52-2.07) | 1.03 (0.51-2.10) |
| Anxiety disorders | 447 822 | 410 372 (3.86) | 2.16 (1.96-2.38)<sup>***</sup> | 1.97 (1.79-2.17)<sup>***</sup> | 288 (8.34) | 386 (5.01) | 1.59 (1.31-1.94)<sup>***</sup> | 1.60 (1.30-1.96)<sup>***</sup> |
| Major depression disorder and other mood disorders | 416 (7.65) | 364 140 (3.42) | 2.18 (1.97-2.41)<sup>***</sup> | 1.95 (1.77-2.16)<sup>***</sup> | 243 (7.04) | 335 (4.35) | 1.74 (1.42-2.15)<sup>***</sup> | 1.58 (1.27-1.97)<sup>***</sup> |
| Substance use disorders | 197 (3.62) | 244 020 (2.29) | 1.66 (1.44-1.91)<sup>***</sup> | 1.50 (1.30-1.73)<sup>***</sup> | 125 (3.62) | 249 (3.23) | 1.40 (1.08-1.83)<sup>***</sup> | 1.34 (1.02-1.75)<sup>***</sup> |
| Any suicidal behavior<sup>d</sup> | 108 (1.99) | 152 847 (1.44) | 1.41 (1.16-1.70)<sup>***</sup> | 1.30 (1.07-1.57)<sup>***</sup> | 72 (2.09) | 151 (1.96) | 1.05 (0.76-1.46) | 1.02 (0.73-1.44) |
| Suicide attempt | 104 (1.91) | 142 579 (1.34) | 1.45 (1.20-1.76)<sup>***</sup> | 1.33 (1.09-1.61)<sup>***</sup> | 69 (2.00) | 140 (1.82) | 1.10 (0.78-1.54) | 1.09 (0.77-1.55) |

**Note:** The analyses are based on the individuals who were alive and living in Sweden in 2001-onwards, i.e., when data from both outpatient and inpatient records were available in the National Patient Register. Diagnoses of PID (exposure) and psychiatric disorders and suicidal behavior (outcomes) were considered for analysis if recorded in the National Patient Register in 2001 or later. Significant ORs are marked in bold. Tourette syndrome or chronic tic disorders and death by suicide are not reported as separate entities due to underpowered analyses.

<sup>a</sup> Adjusted for individual’s year of birth and sex.

<sup>b</sup> Additionally adjusted for history of autoimmune disease.

<sup>c</sup> Adjusted for year of birth and sex on both exposed and unexposed siblings.

<sup>d</sup> Total numbers and percentage of the specific outcomes may not sum up to that of the combined outcomes as the study participants may have more than one specific outcome.

* p<0.05, ** p<0.01, *** p<0.001

Abbreviation: OR, odds ratio; CI, confidence intervals.

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**eFigure.** Association of Single and Joint Exposure to Primary Immunodeficiencies and Autoimmune Diseases With Any Psychiatric Disorder and Any Suicidal Behavior, Stratified by Sex

**Note:** Error bars for association of autoimmune diseases only (AD only) with any psychiatric disorder and any suicidal behavior for men and women are not visible due to narrow confidence intervals.
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