# Supplementary Tables

Supplementary Table 1A: Baseline characteristics\* of participants identified with mental disorders in the UK Biobank
Mental disorders identified by symptom-based outcomes, n = 157,329 (MHQ completers)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Total sample | Lifetime history | Current/recent disorder |
| **DD** | **GAD** | **PE** | **BD** | **DD** | **GAD** | **PE** | **AUD** | **PTSD** |
| n (%) | 157329 (100.0) | 37419 (23.8) | 11106 (7.1) | 7801 (5.0) | 2394 (1.5) | 2904 (1.8) | 2678 (1.7) | 826 (0.5) | 19501 (12.4) | 10057 (6.4) |
| Age (years) (median [IQR]) | 57.0 [50.0, 62.0] | 54.0 [48.0, 60.0] | 54.0 [47.0, 60.0] | 55.0 [48.0, 61.0] | 53.0 [47.0, 59.0] | 51.0 [46.0, 57.0] | 52.0 [46.0, 58.0] | 52.0 [46.0, 60.0] | 54.0 [48.0, 60.0] | 53.0 [47.0, 60.0] |
| Female sex (%) | 56.6 | 69.0 | 66.6 | 60.5 | 53.8 | 63.9 | 66.8 | 50.6 | 35.8 | 66.7 |
| White ethnicity (%) | 97.1 | 97.4 | 97.2 | 96.8 | 95.5 | 96.2 | 95.6 | 93.9 | 98.5 | 95.1 |
| College education or university degree (%) | 45.5 | 45.7 | 46.1 | 47.2 | 46.9 | 35.8 | 38.1 | 42.8 | 48.0 | 42.8 |
| Index of multiple deprivation – England\*\* (median [IQR]) | 11.3 [6.7, 20.0] | 12.5 [7.2, 22.2] | 13.0 [7.3, 23.3] | 13.4 [7.6, 24.0] | 14.1 [8.0, 25.2] | 16.2 [9.0, 29.7] | 14.2 [7.9, 26.5] | 16.1 [8.8, 30.7] | 12.1 [7.0, 21.6] | 14.1 [7.9, 25.8] |
| Average total household income before tax (%) |
| - Less than 18000 | 13.8 | 16.9 | 18.5 | 21.1 | 18.1 | 28.6 | 24.4 | 29.2 | 10.1 | 22.3 |
| - 18000 to 30999 | 23.4 | 24.0 | 23.9 | 23.5 | 22.8 | 23.8 | 25.8 | 23.7 | 18.2 | 24.5 |
| - 31000 to 51999 | 28.9 | 28.6 | 28.4 | 28.3 | 27.6 | 25.2 | 26.0 | 26.1 | 28.6 | 27.0 |
| - 52000 to 100000 | 25.9 | 24.3 | 23.5 | 21.4 | 23.6 | 18.8 | 20.0 | 17.9 | 31.6 | 21.1 |
| - Greater than 100000 | 7.9 | 6.2 | 5.7 | 5.7 | 7.9 | 3.5 | 3.9 | 3.2 | 11.6 | 5.0 |
| Current smoking (%) | 7.2 | 9.7 | 10.8 | 10.8 | 15.5 | 16.5 | 14.0 | 12.7 | 14.5 | 12.3 |
| Previous heart attack (%) | 1.4 | 1.3 | 1.3 | 1.9 | 1.5 | 2.3 | 1.3 | 3.4 | 1.6 | 1.6 |
| Previous stroke (%) | 0.8 | 0.9 | 1.0 | 1.4 | 1.0 | 1.4 | 1.5 | 2.8 | 0.7 | 1.1 |
| History of cancer (%) | 7.8 | 8.1 | 7.8 | 8.0 | 6.4 | 7.4 | 7.6 | 7.5 | 6.2 | 8.2 |

*MHQ: Mental Health Questionnaire; DD: depressive disorder; GAD: generalized anxiety disorder; PE: psychotic experience; BD: bipolar disorder; AUD: alcohol use disorder; PTSD: posttraumatic stress disorder; IQR: interquartile range*

\* *Data collected during the UK Biobank baseline assessment visit (2006–2010; the Mental Health Questionnaire was implemented in 2016). Sociodemographic characteristics and mortality risk factors are based on self-report (except ‘Multiple deprivation index,’ as explained below). Responses such as ‘Do not know’ or ‘Prefer not to answer’ were considered as missing.*

*\*\* Multiple deprivation indexes are official census-based measures of relative socioeconomic deprivation in small areas of the UK. They were imported from governmental sources by the UK Biobank team, harmonized within each country, and assigned to participants according to their postcodes at baseline (UK Biobank, 2018). For brevity, we only report values for England (around 90% of UK Biobank participants).*

Supplementary Table 1B: Baseline characteristics\* of participants identified with mental disorders in the UK Biobank
Mental disorders identified by hospital data linkage of selected ICD-10 diagnoses or groups of diagnoses, n = 502,422 (all participants)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Total sample | DD | GAD | PD | BD | AUD | PTSD |
| n (%) | 502422 (100.0) | 4733 (0.9) | 91 (0.0) | 1116 (0.2) | 707 (0.1) | 2143 (0.4) | 47 (0.0) |
| Age (years) (median [IQR]) | 58.0 [50.0, 63.0] | 56.0 [49.0, 62.0] | 56.0 [50.0, 62.0] | 53.0 [47.0, 60.2] | 55.0 [48.0, 62.0] | 56.0 [50.0, 62.0] | 50.0 [44.0, 56.5] |
| Time since diagnosis (years) (median [IQR]) | - | 4.27 [1.88, 7.84] | 5.74 [2.78, 8.66] | 6.48 [3.64, 9.52] | 5.8 [2.92, 9.06] | 4.23 [2.04, 7.52] | 4.91 [1.77, 6.17] |
| Female sex (%) | 54.4 | 59.5 | 57.1 | 47.2 | 59.8 | 22.4 | 34.0 |
| White ethnicity (%) | 94.6 | 94.8 | 96.6 | 88.5 | 91.7 | 95.8 | 84.4 |
| College education or university degree (%) | 32.7 | 22.6 | 23.3 | 28.1 | 35.7 | 18.3 | 34.0 |
| Index of multiple deprivation – England\*\* (median [IQR]) | 13.1 [7.5, 23.7] | 20.8 [10.9, 36.9] | 14.5 [8.5, 30.0] | 25.4 [13.0, 40.6] | 20.5 [10.3, 36.2] | 26.3 [13.5, 42.5] | 22.1 [12.4, 40.4] |
| Average total household income before tax (%) |  |  |  |  |  |  |  |
| - Less than 18000 | 22.9 | 51.5 | 45.6 | 66.1 | 55.4 | 59.7 | 54.5 |
| - 18000 to 30999 | 25.4 | 23.9 | 29.4 | 19.3 | 19.5 | 19.6 | 15.2 |
| - 31000 to 51999 | 26.0 | 15.5 | 17.6 | 8.4 | 15.4 | 13.0 | 24.2 |
| - 52000 to 100000 | 20.3 | 8.1 | 7.4 | 5.2 | 7.8 | 6.8 | 6.1 |
| - Greater than 100000 | 5.4 | 1.1 | 0.0 | 1.0 | 1.9 | 0.9 | 0.0 |
| Current smoking (%) | 10.6 | 25.1 | 13.5 | 31.0 | 27.1 | 47.7 | 36.2 |
| Previous heart attack (%) | 2.3 | 5.9 | 7.7 | 4.5 | 3.4 | 9.0 | 12.8 |
| Previous stroke (%) | 1.4 | 5.9 | 8.8 | 2.9 | 4.1 | 7.3 | 2.1 |
| History of cancer (%) | 8.3 | 11.6 | 5.6 | 6.9 | 9.7 | 8.5 | 6.4 |

*ICD-10: International Classification of Diseases, 10th revision; DD: depressive disorder (ICD-10 F32–F33); GAD: generalized anxiety disorder (F41.1); PD: psychotic disorder (F2×) or affective psychosis (F30.2, F31.2, F31.5, F32.3, and F33.3); BD: bipolar disorder (F30–F31); AUD: alcohol use disorder (F10.1–F10.2); PTSD: posttraumatic stress disorder (F43.1); IQR: interquartile range*

*\* Data collected during the UK Biobank baseline assessment visit (2006–2010). Sociodemographic characteristics and mortality risk factors are based on self-report (except ‘Multiple deprivation index,’ as explained below). Responses such as ‘Do not know’ or ‘Prefer not to answer’ were considered as missing.*

*\*\* Multiple deprivation indexes are official census-based measures of relative socioeconomic deprivation in small areas of the UK. They were imported from governmental sources by the UK Biobank team, harmonized within each country, and assigned to participants according to their postcodes at baseline (UK Biobank, 2018). For brevity, we only report values for England (around 90% of UK Biobank participants).*

Supplementary Table 1C: Baseline characteristics\* of participants identified with mental disorders in the UK Biobank
Mental disorders identified by hospital data linkage of all ICD-10 diagnoses (grouped by section), n = 502,422 (all participants)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Total sample | F00–F09 | F10–F19 | F20–F29 | F30–F39 | F40–F48 | F50–F59 | F60–F69 | F70–F79 | F80–F89 | F90–F98 | F99 |
| n (%) | 502422 (100.0) | 244 (0.0) | 3981 (0.8) | 828 (0.2) | 5262 (1.0) | 2528 (0.5) | 307 (0.1) | 340 (0.1) | 24 (0.0) | 122 (0.0) | 18 (0.0) | 134 (0.0) |
| Age (years) (median [IQR]) | 58.0 [50.0, 63.0] | 60.0 [53.0, 65.0] | 56.0 [49.0, 62.0] | 53.0 [46.0, 60.0] | 56.0 [49.0, 62.0] | 57.0 [50.0, 63.0] | 57.0 [47.0, 64.5] | 51.0 [45.0, 57.0] | 53.0 [45.8, 57.2] | 55.0 [47.0, 62.0] | 55.5 [48.5, 57.0] | 53.0 [47.0, 59.0] |
| Time since diagnosis (years) (median [IQR]) | - | 4.3 [1.87, 7.02] | 4.34 [2.08, 7.76] | 6.5 [3.5, 9.63] | 4.47 [2.0, 8.04] | 4.54 [2.0, 7.8] | 6.79 [3.42, 9.29] | 7.0 [4.03, 9.83] | 4.32 [1.75, 6.91] | 3.99 [1.61, 6.37] | 5.12 [1.85, 8.04] | 6.25 [3.2, 9.12] |
| Female sex (%) | 54.4 | 41.4 | 26.9 | 42.8 | 59.5 | 58.9 | 36.8 | 57.1 | 37.5 | 37.7 | 38.9 | 61.9 |
| White ethnicity (%) | 94.6 | 93.3 | 95.5 | 87.2 | 94.5 | 94.9 | 92.8 | 95.8 | 100.0 | 93.2 | 83.3 | 91.5 |
| College education or university degree (%) | 32.7 | 30.1 | 17.9 | 27.2 | 24.0 | 22.9 | 32.7 | 22.8 | 13.6 | 19.8 | 18.8 | 35.3 |
| Index of multiple deprivation – England\*\* (median [IQR]) | 13.1 [7.5, 23.7] | 17.1 [8.9, 28.0] | 26.1 [13.4, 41.5] | 27.2 [14.6, 42.0] | 20.8 [10.8, 36.7] | 18.4 [9.9, 33.9] | 16.7 [10.1, 33.9] | 25.5 [13.2, 42.2] | 30.5 [15.7, 53.5] | 29.6 [12.0, 44.1] | 24.3 [9.8, 37.6] | 21.9 [10.9, 34.0] |
| Average total household income before tax (%) |  |  |  |  |  |  |  |  |  |
| - Less than 18000 | 22.9 | 46.0 | 56.9 | 71.1 | 51.7 | 45.6 | 37.7 | 69.5 | 100.0 | 52.3 | 25.0 | 62.0 |
| - 18000 to 30999 | 25.4 | 23.5 | 21.2 | 17.2 | 23.4 | 24.0 | 23.4 | 16.4 | 0.0 | 24.6 | 41.7 | 13.0 |
| - 31000 to 51999 | 26.0 | 17.1 | 13.3 | 6.9 | 15.7 | 19.2 | 20.1 | 10.4 | 0.0 | 15.4 | 25.0 | 12.0 |
| - 52000 to 100000 | 20.3 | 10.7 | 7.5 | 4.0 | 8.1 | 9.8 | 13.9 | 3.0 | 0.0 | 7.7 | 8.3 | 10.0 |
| - Greater than 100000 | 5.4 | 2.7 | 1.1 | 0.8 | 1.2 | 1.4 | 4.9 | 0.7 | 0.0 | 0.0 | 0.0 | 3.0 |
| Current smoking (%) | 10.6 | 15.7 | 48.6 | 33.5 | 25.2 | 19.3 | 17.4 | 34.6 | 27.3 | 15.7 | 38.9 | 28.4 |
| Previous heart attack (%) | 2.3 | 7.8 | 11.7 | 5.0 | 5.6 | 7.6 | 6.8 | 5.9 | 12.5 | 5.7 | 11.1 | 4.5 |
| Previous stroke (%) | 1.4 | 17.6 | 7.1 | 2.7 | 5.6 | 5.2 | 5.9 | 3.8 | 4.2 | 18.9 | 5.6 | 1.5 |
| History of cancer (%) | 8.3 | 9.5 | 9.5 | 6.7 | 11.3 | 10.5 | 12.7 | 7.4 | 0.0 | 12.8 | 11.1 | 9.7 |

*ICD-10: International Classification of Diseases, 10th revision; IQR: interquartile range*

*\* Data collected during the UK Biobank baseline assessment visit (2006–2010). Sociodemographic characteristics and mortality risk factors are based on self-report (except ‘Multiple deprivation index,’ as explained below). Responses such as ‘Do not know’ or ‘Prefer not to answer’ were considered as missing.*

*\*\* Multiple deprivation indexes are official census-based measures of relative socioeconomic deprivation in small areas of the UK. They were imported from governmental sources by the UK Biobank team, harmonized within each country, and assigned to participants according to their postcodes at baseline (UK Biobank, 2018). For brevity, we only report values for England (around 90% of UK Biobank participants).*

Supplementary Table 2A: Age-adjusted mortality rates and hazard ratios associated with mental disorders in the UK Biobank (continuation of Table 2)
Mental disorders identified by hospital data linkage of all ICD-10 diagnoses (grou­­­ped by section), n = 502,422 (all participants), 2006*–*2021

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Mortality (n/N (%)) | MR (per 1000 persons-years) | SMR (per 1000 persons-years) | HR | 95% CI | Adjusted p-value |
| Total sample | 37647/502422 (7.5) | 6.1 | - | - | - | - |
| **All ICD-10 diagnoses (grouped by section)** |  |  |  |  |  |  |
| Organic, including symptomatic, mental disorders (F00*–*F09) | 59/244 (24.2) | 21.8 | 19.4 | 3.29 | [2.52–4.29] | \* |
| Mental and behavioral disorders due to psychoactive substance use (F10–F19) | 1173/3981 (29.5) | 27.1 | 29.1 | 5.44 | [5.11–5.78] | \* |
| Schizophrenia, schizotypal and delusional disorders (F20–F29) | 170/828 (20.5) | 18.0 | 22.1 | 4.26 | [3.64–4.98] | \* |
| Mood [affective] disorders (F30–F39) | 959/5262 (18.2) | 15.7 | 16.7 | 3.0 | [2.81–3.21] | \* |
| Neurotic, stress-related and somatoform disorders (F40–F48) | 348/2528 (13.8) | 11.6 | 11.9 | 2.02 | [1.81–2.24] | \* |
| Behavioral syndromes associated with physiological disturbances and physical factors (F50–F59) | 53/307 (17.3) | 14.5 | 14.2 | 2.33 | [1.78–3.04] | \* |
| Disorders of adult personality and behavior (F60–F69) | 65/340 (19.1) | 16.8 | 19.5 | 4.6 | [3.54–5.98] | \* |
| Mental retardation (F70–F79) | 5/24 (20.8) | 17.9 | 22.3 | 4.58 | [1.76–11.93] | 0.002 |
| Disorders of psychological development (F80–F89) | 34/122 (27.9) | 24.9 | 25.7 | 4.99 | [3.46–7.2] | \* |
| Behavioral and emotional disorders with onset usually occurring in childhood and adolescence (F90–F98) | 3/18 (16.7) | 15.3 | 14.9 | 4.09 | [1.23–13.61] | 0.022 |
| Unspecified mental disorder (F99) | 23/134 (17.2) | 14.6 | 20.4 | 3.57 | [2.37–5.37] | \* |

*ICD-10: International Classification of Diseases, 10th revision; MR: mortality rate; SMR: standardized mortality rate; HR: hazard ratio; CI: confidence interval*

*\* Adjusted p-value < 0.001*

Supplementary Table 2B: Age- and sex-adjusted mortality rates and hazard ratios associated with mental disorders in the UK Biobank

|  |
| --- |
| Mental disorders identified by symptom-based outcomes, n = 157,329 (MHQ completers), 2016–2021 |
|  | **Mortality (n/N (%))** | **MR (per 1000 persons-years)** | **SMR (per 1000 persons-years)** | **HR** | **95% CI** | **Adjusted p-value** |
| Total sample | 3969/157329 (2.5) | 5.1 |  | - | - | - |
| **Lifetime history** |  |  |  |  |  |  |
| Depression | 856/37419 (2.3) | 4.6 | 5.9 | 1.2 | [1.11–1.3] | \* |
| Generalized anxiety disorder | 238/11106 (2.1) | 4.3 | 5.7 | 1.13 | [0.99–1.29] | 0.067 |
| Psychotic experience | 240/7801 (3.1) | 6.2 | 7.2 | 1.44 | [1.26–1.64] | \* |
| Bipolar disorder | 71/2394 (3.0) | 6.0 | 7.2 | 1.51 | [1.19–1.91] | 0.001 |
| **Current/recent disorders** |  |  |  |  |  |  |
| Depression | 102/2904 (3.5) | 7.1 | 10.8 | 2.26 | [1.86–2.76] | \* |
| Generalized anxiety disorder | 70/2678 (2.6) | 5.3 | 7.7 | 1.56 | [1.23–1.97] | \* |
| Psychotic experience | 48/826 (5.8) | 11.9 | 14.5 | 2.91 | [2.19–3.87] | \* |
| Alcohol use disorder | 467/19501 (2.4) | 4.8 | 5.5 | 1.05 | [0.95–1.16] | 0.339 |
| Posttraumatic stress disorder | 264/10057 (2.6) | 5.3 | 7.3 | 1.45 | [1.28–1.65] | \* |
| **Mental disorders identified by hospital data linkage of ICD-10 diagnoses, n = 502,422 (all participants), 2006–2021** |
|  | **Mortality (n/N (%))** | **MR (per 1000 persons-years)** | **SMR (per 1000 persons-years)** | **HR** | **95% CI** | **Adjusted p-value** |
| Total sample | 37647/502422 (7.5) | 6.1 | - | - | - | - |
| **Selected ICD-10 diagnoses or groups of diagnoses** |  |  |  |  |  |  |
| Depression (F32–F33) | 858/4733 (18.1) | 15.6 | 17.2 | 3.07 | [2.86–3.28] | \* |
| Generalized anxiety disorder (F41.1) | 12/91 (13.2) | 11.1 | 14.5 | 2.17 | [1.22–3.87] | 0.01 |
| Psychotic disorder (F2×) or affective psychosis (F30.2, F31.2, F31.5, F32.3, and F33.3) | 232/1116 (20.8) | 18.2 | 21.2 | 4.01 | [3.5–4.58] | \* |
| Bipolar disorder (F30–F31) | 149/707 (21.1) | 18.4 | 21.2 | 3.8 | [3.23–4.48] | \* |
| Alcohol use disorder (F10.1–F10.2) | 720/2143 (33.6) | 31.7 | 29.8 | 5.51 | [5.09–5.98] | \* |
| Posttraumatic stress disorder (F43.1) | 13/47 (27.7) | 26.7 | 28.9 | 7.34 | [4.12–13.09] | \* |
| **All ICD-10 diagnoses grouped by section** |  |  |  |  |  |  |
| Organic, including symptomatic, mental disorders (F00–F09) | 59/244 (24.2) | 21.8 | 18.8 | 3.13 | [2.4–4.08] | \* |
| Mental and behavioral disorders due to psychoactive substance use (F10–F19) | 1173/3981 (29.5) | 27.1 | 26.0 | 4.76 | [4.48–5.07] | \* |
| Schizophrenia, schizotypal and delusional disorders (F20–F29) | 170/828 (20.5) | 18.0 | 21.3 | 4.06 | [3.47–4.76] | \* |
| Mood [affective] disorders (F30–F39) | 959/5262 (18.2) | 15.7 | 17.4 | 3.11 | [2.91–3.32] | \* |
| Neurotic, stress-related and somatoform disorders (F40–F48) | 348/2528 (13.8) | 11.6 | 12.3 | 2.07 | [1.86–2.31] | \* |
| Behavioral syndromes associated with physiological disturbances and physical factors (F50–F59) | 53/307 (17.3) | 14.5 | 11.6 | 1.96 | [1.5–2.57] | \* |
| Disorders of adult personality and behavior (F60–F69) | 65/340 (19.1) | 16.8 | 20.4 | 4.6 | [3.53–5.99] | \* |
| Mental retardation (F70–F79) | 5/24 (20.8) | 17.9 | 13.9 | 3.89 | [1.46–10.36] | 0.008 |
| Disorders of psychological development (F80–F89) | 34/122 (27.9) | 24.9 | 22.0 | 4.59 | [3.19–6.62] | \* |
| Behavioral and emotional disorders with onset usually occurring in childhood and adolescence (F90–F98) | 3/18 (16.7) | 15.3 | 13.4 | 3.74 | [1.13–12.37] | 0.033 |
| Unspecified mental disorder (F99) | 23/134 (17.2) | 14.6 | 21.4 | 3.68 | [2.45–5.53] | \* |

*MHQ: Mental Health Questionnaire; ICD-10: International Classification of Diseases, 10th revision; MR: mortality rate; SMR: standardized mortality rate; HR: hazard ratio; CI: confidence interval*

*\* Adjusted p-value < 0.001*

Supplementary Table 2C: Age-adjusted mortality rates and hazard ratios associated with mental disorders in the UK Biobank
Mental disorders identified by hospital data linkage of ICD-10 diagnoses, n = 157,329 (MHQ completers), 2016–2021

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Mortality (n/N (%)) | MR (per 1000 persons-years) | SMR (per 1000 persons-years) | HR | 95% CI | Adjusted p-value |
| Total sample | 3969/157329 (2.5) | 5.1 | - | - | - | - |
| **Selected ICD-10 diagnoses or groups of diagnoses** |  |  |  |  |  |  |
| Depression (F32–F33) | 186/3638 (5.1) | 10.5 | 11.3 | 2.35 | [2.02–2.72] | \* |
| Generalized anxiety disorder (F41.1) | 1/40 (2.5) | 5.2 | 6.9 | 0.99 | [0.13–7.32] | 0.995 |
| Psychotic disorder (F2×) or affective psychosis (F30.2, F31.2, F31.5, F32.3, and F33.3) | 11/236 (4.7) | 9.6 | 12.4 | 2.42 | [1.33–4.42] | 0.005 |
| Bipolar disorder (F30–F31) | 22/282 (7.8) | 16.2 | 17.4 | 3.82 | [2.51–5.83] | \* |
| Alcohol use disorder (F10.1–F10.2) | 61/804 (7.6) | 15.7 | 15.6 | 3.03 | [2.35–3.92] | \* |
| Posttraumatic stress disorder (F43.1) | 0/38 (0.0) | - | - | - | - | - |
| **All ICD-10 diagnoses (grouped by section)** |  |  |  |  |  |  |
| Organic, including symptomatic, mental disorders (F00–F09) | 37/184 (20.1) | 44.5 | 34.2 | 6.03 | [4.35–8.35] | \* |
| Mental and behavioral disorders due to psychoactive substance use (F10–F19) | 267/3612 (7.4) | 15.3 | 15.4 | 3.2 | [2.83–3.63] | \* |
| Schizophrenia, schizotypal and delusional disorders (F20–F29) | 5/159 (3.1) | 6.4 | 8.9 | 1.62 | [0.67–3.94] | 0.311 |
| Mood [affective] disorders (F30–F39) | 198/3830 (5.2) | 10.6 | 11.5 | 2.38 | [2.06–2.75] | \* |
| Neurotic, stress-related and somatoform disorders (F40–F48) | 100/2502 (4.0) | 8.1 | 8.2 | 1.62 | [1.33–1.98] | \* |
| Behavioral syndromes associated with physiological disturbances and physical factors (F50–F59) | 10/153 (6.5) | 13.4 | 14.7 | 2.76 | [1.5–5.09] | 0.002 |
| Disorders of adult personality and behavior (F60–F69) | 5/101 (5.0) | 10.2 | 16.2 | 3.26 | [1.38–7.72] | 0.009 |
| Mental retardation (F70–F79) | 0/1 (0.0) | - | - | - | - | - |
| Disorders of psychological development (F80–F89) | 1/34 (2.9) | 5.9 | 5.0 | 1.27 | [0.18–8.89] | 0.849 |
| Behavioral and emotional disorders with onset usually occurring in childhood and adolescence (F90–F98) | 0/8 (0.0) | - | - | - | - | - |
| Unspecified mental disorder (F99) | 6/47 (12.8) | 26.8 | 30.8 | 6.34 | [2.82–14.26] | \* |

*ICD-10: International Classification of Diseases, 10th revision; MHQ: Mental Health Questionnaire; MR: mortality rate; SMR: standardized mortality rate; HR: hazard ratio; CI: confidence interval*

*\* Adjusted p-value < 0.001*

*See Table 2 for results of similar analyses using mental disorders identified by symptom-based outcomes.*

Supplementary Table 3A: Proportion of deaths by cause (grouped by ICD-10 chapter) in participants identified with mental disorders in the UK Biobank
Mental disorders identified by symptom-based outcomes, n = 157,329 (MHQ completers), 2016–2021

|  |  |  |  |
| --- | --- | --- | --- |
| Causes of death (%) | Total deaths (n = 3949) | Lifetime history | Current/recent disorders |
| **DD (852)** | **GAD (236)** | **PE (238)** | **BD (70)** | **DD (101)** | **GAD (69)** | **PE (47)** | **AUD (462)** | **PTSD (262)** |
| 1) Certain infectious and parasitic diseases | 0.7 | 0.9 | 2.1 | 1.3 | \* | 1.0 | \* | \* | 0.4 | 0.8 |
| 2) Neoplasms | 57.9 | 57.2 | 49.6 | 47.9 | 42.9 | 35.6 | 37.7 | 36.2 | 56.5 | 50.0 |
| 3) Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | 0.4 | 0.8 | 0.4 | 0.4 | \* | 1.0 | \* | \* | 0.2 | 0.4 |
| 4) Endocrine, nutritional and metabolic diseases | 0.9 | 0.9 | 0.8 | 1.7 | 4.3 | 3.0 | 1.4 | 4.3 | 1.3 | 1.1 |
| 5) Mental and behavioral disorders | 0.7 | 0.5 | 1.3 | 1.7 | 1.4 | 2.0 | 4.3 | 4.3 | 0.4 | 1.1 |
| 6) Diseases of the nervous system | 4.2 | 4.0 | 5.1 | 7.6 | 4.3 | 7.9 | 5.8 | 14.9 | 1.5 | 5.0 |
| 7) Diseases of the eye and adnexa | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 8) Diseases of the ear and mastoid process | \* | 0.1 | \* | \* | \* | \* | \* | \* | 0.2 | \* |
| 9) Diseases of the circulatory system | 19.3 | 18.0 | 20.3 | 20.6 | 21.4 | 20.8 | 17.4 | 17.0 | 20.6 | 16.0 |
| 10) Diseases of the respiratory system | 5.8 | 5.6 | 8.5 | 8.0 | 12.9 | 7.9 | 11.6 | 12.8 | 6.9 | 8.8 |
| 11) Diseases of the digestive system | 2.7 | 2.9 | 3.4 | 1.3 | 1.4 | 5.0 | 7.2 | \* | 5.0 | 5.7 |
| 12) Diseases of the skin and subcutaneous tissue | 0.2 | 0.2 | 0.4 | \* | \* | \* | \* | \* | 0.4 | \* |
| 13) Diseases of the musculoskeletal system and connective tissue | 0.4 | 0.5 | \* | 0.4 | \* | 2.0 | \* | 2.1 | 0.4 | 0.8 |
| 14) Diseases of the genitourinary system | 0.4 | 0.4 | \* | 0.4 | \* | 1.0 | \* | \* | 0.2 | \* |
| 15) Pregnancy, childbirth and the puerperium | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 16) Certain conditions originating in the perinatal period | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 17) Congenital malformations, deformations and chromosomal abnormalities | 0.2 | 0.1 | \* | \* | \* | \* | \* | \* | \* | \* |
| 18) Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified | 0.2 | 0.2 | \* | \* | \* | 1.0 | \* | \* | 0.2 | 0.4 |
| 19) Injury, poisoning and certain other consequences of external causes | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 20) External causes of morbidity and mortality | 1.8 | 2.8 | 2.5 | 2.1 | 8.6 | 6.9 | 5.8 | 2.1 | 1.7 | 3.8 |
| 21) Factors influencing health status and contact with health services | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 22) Codes for special purposes | 4.2 | 4.8 | 5.5 | 6.7 | 2.9 | 5.0 | 8.7 | 6.4 | 3.9 | 6.1 |

*ICD-10: International Classification of Diseases, 10th revision; MHQ: Mental Health Questionnaire; DD: depressive disorder; GAD: generalized anxiety disorder; PE: psychotic experience; BD: bipolar disorder; AUD: alcohol use disorder; PTSD: posttraumatic stress disorder*

*\* Proportion < 0.1%*

Supplementary Table 3B: Proportion of deaths by cause (grouped by ICD-10 chapter) in participants identified with mental disorders in the UK Biobank
Mental disorders identified by hospital data linkage of selected ICD-10 diagnoses or groups of diagnoses, n = 502,422 (all participants), 2006–2021

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Causes of death (%) | Total deaths (n = 37499) | DD (854) | GAD (12) | PD (232) | BD (149) | AUD (718) | PTSD (13) |
| 1) Certain infectious and parasitic diseases | 0.8 | 1.2 | \* | 1.3 | 0.7 | 0.1 | \* |
| 2) Neoplasms | 50.5 | 31.9 | 50.0 | 22.4 | 24.2 | 26.7 | 23.1 |
| 3) Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | 0.2 | 0.2 | \* | \* | \* | 0.1 | \* |
| 4) Endocrine, nutritional and metabolic diseases | 1.2 | 2.9 | \* | 3.4 | 3.4 | 1.7 | \* |
| 5) Mental and behavioral disorders | 2.2 | 2.9 | \* | 1.3 | 4.0 | 2.4 | \* |
| 6) Diseases of the nervous system | 5.6 | 3.7 | 8.3 | 6.5 | 4.0 | 2.2 | 15.4 |
| 7) Diseases of the eye and adnexa | \* | \* | \* | \* | \* | \* | \* |
| 8) Diseases of the ear and mastoid process | \* | \* | \* | \* | \* | \* | \* |
| 9) Diseases of the circulatory system | 20.6 | 23.3 | 33.3 | 34.1 | 26.8 | 23.8 | 23.1 |
| 10) Diseases of the respiratory system | 7.1 | 12.5 | 8.3 | 13.4 | 16.8 | 13.0 | 15.4 |
| 11) Diseases of the digestive system | 3.9 | 7.6 | \* | 3.4 | 1.3 | 17.8 | 15.4 |
| 12) Diseases of the skin and subcutaneous tissue | 0.2 | 0.7 | \* | \* | \* | 0.6 | \* |
| 13) Diseases of the musculoskeletal system and connective tissue | 0.6 | 0.6 | \* | \* | 0.7 | 0.3 | \* |
| 14) Diseases of the genitourinary system | 0.7 | 0.7 | \* | 0.4 | 2.0 | 1.0 | \* |
| 15) Pregnancy, childbirth and the puerperium | \* | \* | \* | \* | \* | \* | \* |
| 16) Certain conditions originating in the perinatal period | \* | \* | \* | \* | \* | \* | \* |
| 17) Congenital malformations, deformations and chromosomal abnormalities | 0.2 | 0.4 | \* | \* | \* | 0.1 | \* |
| 18) Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified | 0.4 | 0.5 | \* | 1.7 | 1.3 | 1.9 | \* |
| 19) Injury, poisoning and certain other consequences of external causes | \* | \* | \* | \* | \* | \* | \* |
| 20) External causes of morbidity and mortality | 2.7 | 7.6 | \* | 10.3 | 8.7 | 6.5 | 7.7 |
| 21) Factors influencing health status and contact with health services | \* | \* | \* | \* | \* | \* | \* |
| 22) Codes for special purposes | 3.1 | 3.3 | \* | 1.7 | 6.0 | 1.7 | \* |

*ICD-10: International Classification of Diseases, 10th revision; DD: depressive disorder (ICD-10 F32–F33); GAD: generalized anxiety disorder (F41.1); PD: psychotic disorder (F2×) or affective psychosis (F30.2, F31.2, F31.5, F32.3, and F33.3); BD: bipolar disorder (F30–F31); AUD: alcohol use disorder (F10.1–F10.2); PTSD: posttraumatic stress disorder (F43.1)*

*\* Proportion < 0.1%*

Supplementary Table 3C: Proportion of deaths by cause (grouped by ICD-10 chapter) in participants identified with mental disorders in the UK Biobank
Mental disorders identified by hospital data linkage of all ICD-10 diagnoses (grouped by section), n = 502,422 (all participants), 2006–2021

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Causes of death (%) | Total deaths (n = 37499) | F00–F09 (59) | F10–F19 (1170) | F20–F29 (170) | F30–F39 (955) | F40–F48 (347) | F50–F59 (53) | F60–F69 (65) | F70–F79 (5) | F80–F89 (34) | F90–F98 (3) | F99 (23) |
| 1) Certain infectious and parasitic diseases | 0.8 | 1.7 | 0.8 | 1.2 | 1.0 | 0.6 | \* | 1.5 | \* | \* | \* | \* |
| 2) Neoplasms | 50.5 | 25.4 | 30.6 | 22.4 | 31.4 | 36.0 | 28.3 | 23.1 | \* | 11.8 | \* | 30.4 |
| 3) Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | 0.2 | \* | \* | \* | 0.2 | 0.3 | \* | 1.5 | \* | \* | \* | \* |
| 4) Endocrine, nutritional and metabolic diseases | 1.2 | \* | 1.6 | 4.1 | 2.9 | 0.6 | 1.9 | 4.6 | \* | 2.9 | \* | \* |
| 5) Mental and behavioral disorders | 2.2 | 5.1 | 2.5 | 0.6 | 2.9 | 2.0 | 9.4 | 4.6 | \* | 5.9 | \* | 4.3 |
| 6) Diseases of the nervous system | 5.6 | 5.1 | 2.3 | 7.1 | 3.7 | 5.5 | 1.9 | 3.1 | \* | 8.8 | \* | 8.7 |
| 7) Diseases of the eye and adnexa | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 8) Diseases of the ear and mastoid process | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 9) Diseases of the circulatory system | 20.6 | 30.5 | 23.8 | 32.9 | 23.8 | 23.3 | 30.2 | 21.5 | 40.0 | 52.9 | 33.3 | 17.4 |
| 10) Diseases of the respiratory system | 7.1 | 18.6 | 13.9 | 14.7 | 13.1 | 13.3 | 9.4 | 9.2 | 20.0 | 2.9 | 33.3 | 8.7 |
| 11) Diseases of the digestive system | 3.9 | 5.1 | 14.0 | 4.7 | 7.0 | 6.6 | 11.3 | 6.2 | \* | 5.9 | \* | 4.3 |
| 12) Diseases of the skin and subcutaneous tissue | 0.2 | \* | 0.4 | \* | 0.7 | 0.3 | \* | 1.5 | \* | \* | 33.3 | \* |
| 13) Diseases of the musculoskeletal system and connective tissue | 0.6 | \* | 0.3 | \* | 0.5 | 0.3 | \* | 1.5 | \* | \* | \* | \* |
| 14) Diseases of the genitourinary system | 0.7 | 1.7 | 0.9 | \* | 0.8 | 0.9 | 1.9 | \* | \* | \* | \* | \* |
| 15) Pregnancy, childbirth and the puerperium | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 16) Certain conditions originating in the perinatal period | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 17) Congenital malformations, deformations and chromosomal abnormalities | 0.2 | \* | 0.3 | \* | 0.3 | 0.3 | \* | \* | 20.0 | \* | \* | \* |
| 18) Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified | 0.4 | 1.7 | 1.5 | 2.4 | 0.5 | 1.4 | 1.9 | \* | \* | 2.9 | \* | \* |
| 19) Injury, poisoning and certain other consequences of external causes | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 20) External causes of morbidity and mortality | 2.7 | 3.4 | 5.2 | 8.8 | 7.5 | 6.1 | 1.9 | 18.5 | \* | 2.9 | \* | 21.7 |
| 21) Factors influencing health status and contact with health services | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |
| 22) Codes for special purposes | 3.1 | 1.7 | 1.7 | 1.2 | 3.5 | 2.6 | 1.9 | 3.1 | 20.0 | 2.9 | \* | 4.3 |

*ICD-10: International Classification of Diseases, 10th revision*

*\* Proportion < 0.1%*