## Appendix A. Codes Used to Identify Conditions Using Medical and Pharmacy Claims

| **Condition** | **Codes Used** |
| --- | --- |
| Mental health | **ICD10:** F0150, F0151, F0280, F0281, F0390, F0391, F04, F05, F060, F062F0630, F0631, F0632, F0633, F0634, F064, F070, F0781, F0789, F079F09, F200, F201, F202, F203, F205, F2081, F2089, F209, F21, F22, F23, F24, F250, F251, F258, F259, F28, F29, F3010, F3011, F3012, F3013, F302, F303, F304, F308, F309, F310, F3110, F3111, F3112, F3113, F312, F3130, F3131, F3132, F314, F315, F3160, F3161, F3162, F3163, F3164, F3170, F3171, F3172, F3173, F3174, F3175, F3176, F3177, F3178, F3181, F3189, F319, F320, F321, F322, F323, F324, F325, F328, F3281, F3289, F329, F330, F331, F332, F333F3340, F3341, F3342, F338, F339, F340, F341, F348, F3481, F3489, F349, F39, F4000, F4001, F4002, F4010, F4011, F40210, F40218, F40220, F40228, F40230, F40231, F40232, F40233, F40240, F40241, F40242, F40243, F40248, F40290, F40291, F40298, F408, F409, F410, F411, F413, F418, F419, F42, F422, F423, F424, F428, F429, F430, F4310, F4311, F4312, F4320, F4321, F4322, F4323, F4324, F4325, F4329, F438, F439, F482, F488, F489, F600, F601, F602, F603, F604, F605, F606, F607, F6081, F6089, F609, F630, F631, F632, F633, F6381, F6389, F639, F642, F69, F70, F71, F72, F73, F78, F79, F800, F801, F802, F804, F8081, F8082, F8089, F809, F810, F812, F8181, F8189, F819, F82, F840, F842, F843, F845, F848, F849, F88, F89, F900, F901, F902, F908, F909, F910, F911, F912, F913, F918, F919, F930, F938, F939, F940, F941, F942, F948, F949, F950, F951, F952, F958, F959, F980, F981, F9821, F9829, F983, F984, F985, F988, F989, G300, G301, G308, G309, G3101, G3109, G311, G3183, R4181, R4183, R452, R453, R454, R455, R456, R457, R4581, R4582, R4583, R4584, R45850, R4586, R460, R461, R462, R463, R464, R465, R466, R467, R4681, R4689, R480, R54 |
| Opioid use disorder | **ICD10:** F1110 , F11120, F11121, F11122, F11129, F1114 , F11150, F11151, F11159, F11181, F11182, F11188, F1119 , F1120 , F1121 , F11220, F11221, F11222, F11229, F1123, F1124 , F11250, F11251, F11259, F11281, F11282, F11288, F1129 , F1190 , F11920, F11921, F11922, F11929, F1193 , F1194 , F11950, F11951, F11959, F11981, F11982, F11988, F1199 , R781 , T402X1A, T402X1D, T402X1S, T402X2A, T402X2D, T402X2S, T402X3A, T402X3D, T402X3S, T402X4A, T402X4D, T402X5A, T402X5D, T402X5S, T402X6A, T402X6D, T402X6S, T403X1A, T403X1D, T403X2A, T403X2D, T403X2S, T403X3A, T403X3D, T403X3S, T403X4A, T403X4D, T403X4S, T403X5A, T403X5D, T403X5S, T403X6A, T403X6D, T403X6S |
| Nonopioid substance use disorder | **ICD10:** F1010, F10120, F10121, F10129, F1014, F10150, F10151, F10159, F10180, F10181, F10182, F10188, F1019, F1020, F1021, F10220, F10221, F10229, F10230, F10231, F10232, F10239, F1024, F10250, F10251, F10259, F1026, F1027, F10280, F10281, F10282, F10288, F1029, F10920, F10921, F10929, F1094, F10950, F10951, F10959, F1096, F1097, F10980, F10981, F10982, F10988, F1099, F1210, F12120, F12121, F12122, F12129, F12150, F12151, F12159, F12180, F12188, F1219, F1220, F1221, F12220, F12221, F12222, F12229, F12250, F12251, F12259, F12280, F12288, F1229, F1290, F12920, F12921, F12922, F12929, F12950, F12951, F12959, F12980, F12988, F1299, F1310, F13120, F13121, F13129, F1314, F13150, F13151, F13159, F13180, F13181, F13182, F13188, F1319, F1320, F1321, F13220, F13221, F13229, F13230, F13231, F13232, F13239, F1324, F13250, F13251, F13259, F1326, F1327, F13280, F13281, F13282, F13288, F1329, F1390, F13920, F13921, F13929, F13930, F13931, F13932, F13939, F1394, F13950, F13951, F13959, F1396, F1397, F13980, F13981, F13982, F13988, F1399, F1410, F14120, F14121, F14122, F14129, F1414, F14150, F14151, F14159, F14180, F14181, F14182, F14188, F1419, F1420, F1421, F14220,F14221, F14222, F14229, F1423, F1424, F14250, F14251, F14259, F14280, F14281,F14282, F14288, F1429, F1490, F14920, F14921, F14922, F14929, F1494, F14950, , F14951, F14959, F14980, F14981, F14982, F14988, F1499, F1510, F15120, F15121, F15122, F15129, F1514, F15150, F15151, F15159, F15180, F15181, F15182, F15188, F1519, F1520, F1521, F15220, F15221, F15222, F15229, F1523, F1524, F15250, F15251, F15259, F15280, F15281, F15282, F15288, F1529, F1590, F15920, F15921, F15922, F15929, F1593, F1594, F15950, F15951, F15959, F15980, F15981, F15982, F15988, F1599, F1610, F16120, F16121, F16122, F16129, F1614, F16150, F16151, F16159, F16180, F16183, F16188, F1619, F1620, F1621, F16220, F16221, F16229, F1624, F16250, F16251, F16259, F16280, F16283, F16288, F1629, F1690, F16920,F16921, F16929, F1694, F16950, F16951, F16959, F16980, F16983, F16988, F1699F1810, F18120, F18121, F18129, F1814, F18150, F18151, F18159, F1817, F18180, F18188, F1819, F1820, F1821, F18220, F18221, F18229, F1824, F18250, F18251, F18259, F1827, F18280, F18288, F1829, F1890, F18920, F18921, F18929, F1894, F18950, F18951, F18959, F1897, F18980, F18988, F1899, F1910, F19120, F19121, F19122, F19129, F1914, F19150, F19151, F19159, F1916, F1917, F19180, F19181, F19182, F19188, F1919, F1920, F1921, F19220, F19221, F19222, F19229, F19230, F19231, F19232, F19239, F1924, F19250, F19251, F19259, F1926, F1927, F19280, F19281, F19282, F19288, F1929, F1990, F19920, F19921, F19922, F19929, F19930, F19931, F19932, F19939, F1994, F19950, F19951, F19959, F1996, F1997, F19980, F19981, F19982, F19988, F1999 |
| Pharmacotherapy for opioid use disorder | **CPT:** H0020, J0571, J0572, J0573, J0574J0575, J0592, J1230, S0109**NDC:** 00054-0176-13, 00054-0177-13, 00054-0188-13, 00054-0189-13, 00056-0011-30, 00056-0011-70, 00093-5378-56, 00093-5379-56, 00093-5720-56, 00093-5721-56, 00185-0039-01, 00185-0039-30, 00228-3153-03, 00228-3154-03, 00228-3154-73, 00228-3155-03, 00228-3155-73, 00228-3156-03, 00378-0923-93, 00378-0924-93, 00406-0092-03, 00406-1170-01, 00406-1170-03, 00406-1923-03, 00406-1924-03, 00490-0051-00, 00490-0051-30, 00490-0051-60, 00490-0051-90, 00555-0902-01, 00555-0902-02, 12496-1202-01, 12496-1202-03, 12496-1204-01, 12496-1204-03, 12496-1208-01, 12496-1208-03, 12496-1212-01, 12496-1212-03, 12496-1278-02, 12496-1283-02, 12496-1306-02, 12496-1310-02, 16590-0666-05, 16590-0666-30, 16590-0667-05, 16590-0667-30, 16590-0667-90, 16729-0081-01, 16729-0081-10, 23490-9270-03, 23490-9270-06, 23490-9270-09, 35356-0004-07, 35356-0004-30, 35356-0555-30, 35356-0556-30, 42291-0174-30, 42291-0175-30, 42291-0632-30, 43063-0184-07, 43063-0184-30, 43063-0591-15, 47335-0326-83, 47335-0326-88, 49999-0395-07, 49999-0395-15, 49999-0395-30, 49999-0638-30, 49999-0639-30, 50383-0287-93, 50383-0294-93, 50383-0924-93, 50383-0930-93, 50436-0105-01, 51224-0206-30, 51224-0206-50, 51285-0275-01, 51285-0275-02, 52152-0105-02, 52152-0105-30, 52959-0304-30, 52959-0749-30, 53217-0138-30, 54123-0114-30, 54123-0914-30, 54123-0929-30, 54123-0957-30, 54123-0986-30, 54569-5496-00, 54569-5739-00, 54569-5739-01, 54569-5739-02, 54569-6399-00, 54569-6408-00, 54569-6578-00, 54868-5574-00, 54868-5707-00, 54868-5707-01, 54868-5707-02, 54868-5707-03, 54868-5707-04, 54868-5750-00, 55045-3784-03, 55700-0147-30, 55700-0184-30, 55700-0302-30, 55700-0303-30, 55887-0312-04, 55887-0312-15, 59385-0012-01, 59385-0012-30, 59385-0014-01, 59385-0014-30, 59385-0016-01, 59385-0016-30, 63459-0300-42, 63629-4028-01, 63629-4034-01, 63629-4034-02, 63629-4034-03, 63629-4092-01, 63874-1084-03, 63874-1085-03, 63874-1173-03, 63874-1174-03, 65162-0415-03, 65162-0416-03, 65694-0100-03, 65694-0100-10, 65757-0300-01, 66336-0015-30, 66336-0016-30, 68071-1380-03, 68071-1510-03, 68084-0291-11, 68084-0291-21, 68094-0853-62, 68115-0680-30, 68258-2991-03, 68258-2999-03, 68308-0202-30, 68308-0208-30  |

## Appendix B. Industry Type of Employees Who Did and Did Not Complete a Health Risk Assessment

| **Variable** | **Employees With HRA Data**  | **All Employees** |
| --- | --- | --- |
| ***n*** | **%** | ***n*** | **%** |
| Total | 972,936 |  | 16,886,347 |   |
| Industry |  |  |   |  |
| Oil and gas extraction, mining |  |  | 162,125 | 0.96 |
| Manufacturing, durable goods | 357,700 | 36.77 | 2,528,758 | 14.98 |
| Manufacturing, nondurable goods | 79,542 | 8.18 | 895,051 | 5.30 |
| Transportation, communications, utilities | 122,419 | 12.58 | 1,820,010 | 10.78 |
| Retail trade | 106,606 | 10.96 | 837,823 | 4.96 |
| Finance, insurance, real estate | 273,053 | 28.06 | 1,734,943 | 10.27 |
| Services | 29,526 | 3.03 | 2,983,831 | 17.67 |
| Other |  |  | 106,089 | 0.63 |
| Unknown | 4,090 | 0.42 | 5,817,717 | 34.45 |

HRA, health risk assessment.

## **Appendix C.** Bivariate Analysis

TABLE C1. Bivariate Analysis of Sample Demographic Characteristics and Outcomes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | Lost At Work Productivity Days | Sick Days | Absences Related to Family Issues | Health Care Costs |
|   | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Sex |   |   |   |   |   |   |  |  |
|  Male | 5.33 | 25.21 | 2.49 | 3.42 | 0.12 | 0.75 | 5,913 | 24,178 |
|  Female | 7.33 | 26.78 | 2.73 | 5.12 | 0.20 | 1.08 | 7,670 | 24,080 |
|  P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |
| Age (yr) |   |   |   |   |   |   |   |   |
|  18-24 | 7.95 | 25.65 | 3.48 | 2.16 | 0.17 | 0.92 | 2,876 | 13,589 |
|  25-34 | 6.55 | 23.99 | 2.59 | 2.90 | 0.18 | 0.91 | 4,143 | 16,339 |
|  35-44 | 6.32 | 25.46 | 2.47 | 4.18 | 0.19 | 1.01 | 5,296 | 20,417 |
|  45-54 | 6.03 | 26.91 | 2.56 | 4.55 | 0.14 | 0.91 | 7,252 | 24,891 |
|  55-64 | 5.46 | 25.81 | 2.64 | 5.18 | 0.14 | 0.96 | 10,096 | 31,292 |
|  P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |
| Industry |   |   |   |   |   |   |   |   |
|  Oil and Gas |  |  |  |  |  |  | 7,475 | 25,531 |
| Manufacturing, Durable  | 10.09 | 42.84 | 2.15 | 2.01 | 2.45 | 2.64 | 6,531 | 23,776 |
| Manufacturing, Nondurable  | 9.93 | 31.00 | 2.92 | 4.22 |   |   | 6,370 | 22,610 |
| Transportation, Communications, Utilities | 5.75 | 21.70 | 2.56 | 2.68 | 2.16 | 3.46 | 6,768 | 24,190 |
|  Retail Trade |   |   | 2.33 | 1.71 |   |   | 5,544 | 25,027 |
|  Finance, Insurance, Real Estate | 4.71 | 20.84 | 3.02 | 7.01 | 0.15 | 0.88 | 6,505 | 23,169 |
|  Services |  |  |  |  |  |  | 6,812 | 23,046 |
|  P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |
| Plan type |   |   |   |   |   |   |   |   |
|  Generous (PPO) | 7.87 | 27.38 | 2.56 | 3.14 | 0.18 | 0.98 | 7,083 | 25,062 |
|  Network (HMO) | 10.26 | 43.06 | 2.73 | 5.34 | 0.10 | 0.58 | 7,145 | 24,452 |
|  High Deductible | 4.87 | 19.86 | 2.61 | 5.40 | 0.14 | 0.84 | 5,550 | 21,277 |
|  P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |
| Salary (vs hourly) |   |   |   |   |   |   |   |   |
|  Salary  | 6.31 | 27.65 | 2.51 | 4.59 | 0.11 | 0.68 | 6,316 | 22,984 |
|  Hourly | 5.65 | 21.78 | 2.78 | 3.04 | 0.23 | 1.17 | 7,072 | 23,787 |
|  P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |
| Region |   |   |   |   |   |   |   |   |
| West | 6.19 | 22.48 | 2.62 | 2.87 | 0.21 | 1.11 | 6,445 | 25,722 |
| South | 5.82 | 21.45 | 2.90 | 3.96 | 0.17 | 0.96 | 6,675 | 23,018 |
| Northeast | 4.87 | 21.31 | 2.18 | 6.21 | 0.12 | 0.76 | 7,560 | 27,050 |
| Midwest | 7.68 | 34.22 | 2.35 | 3.40 | 0.19 | 0.96 | 6,489 | 23,042 |
| P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |

Sample included in health care cost sample included all employees regardless of HRA completion. HMO, health maintenance organization; PPO, preferred provider organization.

TABLE A2. Bivariate Analysis of Sample Health Characteristics and Outcomes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | Lost At Work Productivity Days | Sick Days | Absences Related to Family Issues | Health Care Costs |
|   | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Opioid use disorder  |   |   |   |   |   |   |  |  |
| No MAT | 24.36 | 55.66 | 3.43 | 13.86 | 0.45 | 1.88 | 31,997 | 64,596 |
| MAT | 13.36 | 35.87 | 2.95 | 4.31 | 0.28 | 1.45 | 18,089 | 36,357 |
| No opioid use disorder | 6.05 | 25.73 | 2.59 | 4.18 | 0.17 | 0.94 | 6,641 | 23,844 |
| P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |
| Other employee health |   |   |   |   |   |   |   |   |
| Nonopioid Substance Use Disorder | 14.93 | 41.81 | 3.02 | 8.17 | 0.33 | 1.46 | 22,606 | 49,379 |
| No Nonopioid Substance Use Disorder | 6.02 | 25.65 | 2.59 | 4.16 | 0.16 | 0.94 | 6,572 | 23,668 |
| P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |
| Mental illness | 12.05 | 35.89 | 2.84 | 6.26 | 0.28 | 1.35 | 12,660 | 35,515 |
| No mental illness | 5.11 | 23.63 | 2.55 | 3.75 | 0.14 | 0.83 | 5,604 | 21,077 |
| P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |
| Chronic conditions | 7.25 | 28.55 | 2.63 | 4.72 | 0.19 | 1.03 | 9,519 | 28,772 |
| No chronic conditions | 3.21 | 16.97 | 2.51 | 2.81 | 0.12 | 0.70 | 848 | 3,427 |
| P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |
| Family unit |   |   |   |   |   |   |   |   |
| Spouse only | 5.55 | 24.94 | 2.43 | 4.05 | 0.17 | 0.91 | 6,750 | 23,667 |
| Spouse + dependent | 5.27 | 25.57 | 2.39 | 4.20 | 0.15 | 0.85 | 6,625 | 23,979 |
| Dependent only | 6.86 | 27.66 | 2.70 | 4.78 | 0.22 | 1.13 | 7,007 | 23,417 |
| None | 6.81 | 26.09 | 2.77 | 4.18 | 0.16 | 0.98 | 6,741 | 24,546 |
| P value | <.0001 |   | <.0001 |   | <.0001 |   | <.0001 |   |

Sample included in health care cost sample included all employees regardless of HRA completion. HRA, health risk assessment; MAT, medication-assisted treatment.

## **Appendix D.** Full Model Results

Table D1. Predictors of Work Productivity and Health-Related Absences Among Employees With Health Risk Assessment Data, Full Model Results

| **Variable** | **Lost At-Work Productivity Days** | ***P*** | **Sick Days** | ***P*** | **Absences Related to Family Issues** | ***P*** |
| --- | --- | --- | --- | --- | --- | --- |
| Intercept | 8.91 | <0.0001 | 3.22 | <0.0001 | 0.13 | <0.0001 |
| Male | –1.60 | <0.0001 | –0.01 | 0.3971 | –0.05 | <0.0001 |
| Age (yr) |   |   |   |   |   |   |
| 18–24 | Reference |   | Reference |   | Reference |   |
| 25–34 | –1.39 | 0.0211 | –0.82 | <0.0001 | 0.03 | 0.0334 |
| 35–44 | –1.89 | 0.0017 | –0.92 | <0.0001 | 0.05 | 0.0007 |
| 45–54 | –2.72 | <0.0001 | –0.75 | <0.0001 | –0.01 | 0.5387 |
| 55–64 | –3.64 | <0.0001 | –0.63 | <0.0001 | –0.02 | 0.2458 |
| Industry |   |   |   |   |   |   |
| Oil and gas extraction, mining |   |   |   |   |   |   |
| Manufacturing, durable goods | –9.85 | <0.0001 | –1.07 | <0.0001 | 2.37 | <0.0001 |
| Manufacturing, nondurable goods | 5.57 | 0.0090 | 0.02 | 0.1899 |   |   |
| Transportation, communications, utilities | 0.72 | 0.0032 | –0.74 | <0.0001 | 2.03 | <0.0001 |
| Retail trade |   |   | –0.65 | <0.0001  |   |   |
| Finance, insurance, real estate | Reference |   | Reference |   | Reference |   |
| Services |   |   | 0.64  | <0.0001  |   |   |
| Other/unknown |   |   | 0.79 | <0.0001  |   |   |
| Plan type |  |  |  |  |  |  |
| Generous (PPO) | Reference |  | Reference |  | Reference |  |
| Narrow network (HMO) | 13.47 | <0.0001 | 0.18 | <0.0001  | –0.02 | 0.1104 |
| Consumer-driven (high deductible) | –3.14 | <0.0001 | 0.30 | <0.0001  | –0.03 | <0.0001 |
| Salary (vs hourly) |  |  |  |  |  |  |
| Salary | –0.93 | <0.0001 | –0.03 | 0.0013 | –0.09 | <0.0001 |
| Hourly | Reference |  | Reference |  | Reference |  |
| Region |   |   |   |   |   |   |
| West | 1.24 | <0.0001 | 0.92 | <0.0001 | 0.06 | <0.0001 |
| South | 0.45 | 0.0453 | 0.79 | <0.0001 | 0.03 | <0.0001 |
| Northeast | Reference |   | Reference |   | Reference |   |
| Midwest | 0.04 | 0.8717 | 0.58 | <0.0001 | –0.01 | 0.1118 |
| Family unit |   |   |   |   |   |   |
| Spouse only | –0.96 | <0.0001 | –0.25 | <0.0001 | 0.02 | <0.0001 |
| Spouse + dependent | –1.29 | <0.0001 | –0.30 | <0.0001 | 0.02 | 0.0028 |
| Dependent only | –0.37 | 0.2098 | –0.04 | 0.0163 | 0.04 | <0.0001 |
| None | Reference |   | Reference |   | Reference |   |
| Employee health |   |   |   |   |   |   |
| OUD and no evidence of MAT  | 14.10 | <0.0001 | 0.67 | <0.0001 | 0.16 | 0.0011 |
| OUD and evidence of MAT | 1.90 | 0.2639 | 0.32 | 0.0004 | 0.01 | 0.8313 |
| Nonopioid SUD  | 4.94 | <0.0001 | 0.24 | <0.0001 | 0.08 | 0.0004 |
| Mental illness | 5.42 | <0.0001 | 0.22 | <0.0001 | 0.10 | <0.0001 |
| Chronic conditions | 2.79 | <0.0001 | 0.08 | <0.0001 | 0.03 | <0.0001 |
| Family member health |   |   |   |   |   |   |
| Dependent |  |  |  |  |  |  |
| OUD and no evidence of MAT  | –1.02 | 0.6724 | 0.04 | 0.7596 | 0.08 | 0.2330 |
| OUD and evidence of MAT  | –0.59 | 0.7798 | 0.12 | 0.3599 | –0.04 | 0.5078 |
| Nonopioid SUD | 0.18 | 0.8298 | –0.10 | 0.0699 | 0.02 | 0.4706 |
| Mental illness | 0.15 | 0.6149 | 0.00 | 0.8010 | 0.01 | 0.3323 |
| Spouse |  |  |  |  |  |  |
| OUD and no evidence of MAT  | –1.11 | 0.5247 | 0.20 | 0.0515 | 0.09 | 0.0604 |
| OUD and evidence of MAT  | 2.61 | 0.1473 | 0.02 | 0.8608 | 0.00 | 0.9351 |
| Nonopioid SUD | 1.22 | 0.2455 | –0.01 | 0.9156 | 0.01 | 0.5887 |
| Mental illness | 0.35 | 0.1963 | 0.06 | 0.0005 | 0.03 | 0.0001 |

HMO, health maintenance organization; MAT, medication-assisted treatment; OUD, opioid use disorder; PPO, preferred provider organization; SUD, substance use disorder.

Table D2. Predictors of Health Care Costs Among Employees With HRA Data**,** Full Model Results

|  |  |  |
| --- | --- | --- |
| **Variable** | **Employees with HRA Data** | **Employees with and without HRA Data** |
| **Total Health Care Costs** | ***P*** | **Total Health Care Costs** | ***P*** |
| Intercept | 1,061.56 | <0.0001 | 483.81 | <0.0001 |
| Male | –851.72 | <0.0001 | –520.43 | <0.0001 |
| Age (yr) |   |   |   |   |
| 18–24 | Reference |   | Reference |   |
| 25–34 | 454.72 | 0.0010 | 418.54 | <0.0001 |
| 35–44 | 1,106.57 | <0.0001 | 961.17 | <0.0001 |
| 45–54 | 2,244.09 | <0.0001 | 2,312.77 | <0.0001 |
| 55–64 | 3,856.81 | <0.0001 | 4,329.89 | <0.0001 |
| Industry |   |   |   |   |
| Oil & gas extraction, mining |   |   | 1,308.85 | <0.0001 |
| Manufacturing, durable goods | –651.23 | <0.0001 | 332.32 | <0.0001 |
| Manufacturing, nondurable goods | –731.02 | <0.0001 | 624.43 | <0.0001 |
| Transportation, communications, utilities | –356.20 | <0.0001 | 629.29 | <0.0001 |
| Retail trade | –1,194.17 |  <0.0001 | 215.24 |  <0.0001 |
| Finance, insurance, real estate | Reference |   | 665.77 |  <0.0001 |
| Services | –142.72 |  0.3189 | 414.91 |  <0.0001 |
| Other/unknown | –606.52 |  0.0735 | Reference |   |
| Plan type |  |  |  |  |
| Generous (PPO) | Reference |  | Reference |  |
| Narrow network (HMO) | –67.34 | 0.4507 | –133.63 |  <0.0001 |
| Consumer–driven (high deductible) | –1,157.25 | <0.0001 | –819.11 | <0.0001 |
| Salary (vs hourly) |  |  |  |  |
| Salary | 114.85 | 0.0348 | -168.00 | <0.0001 |
| Hourly | Reference |  | Reference |  |
| Missing |  |  | 19.37 | 0.3952 |
| Region |   |   |   |   |
| West | 358.58 | <0.0001 | -412.42 | <0.0001 |
| South | 27.22 | 0.6615 | -816.30 | <0.0001 |
| Northeast | Reference |   | Reference |   |
| Midwest | –156.74 | 0.0319 | –826.93 | <0.0001 |
| Family unit |   |   |   |   |
| Spouse only | –76.47 | 0.1680 | –115.71 | <0.0001 |
| Spouse + dependent | –691.66 | <0.0001 | –840.62 | <0.0001 |
| Dependent only | –603.94 | <0.0001 | –676.52 | <0.0001 |
| None | Reference |   | Reference |   |
| Employee health |   |   |   |   |
| OUD and no evidence of MAT  | 21,569.73 | <0.0001 | 19,177.87 | <0.0001 |
| OUD and evidence of MAT  | 6,293.81 | <0.0001 | 5,427.38 | <0.0001 |
| Nonopioid SUD | 7,947.63 | <0.0001 | 10,875.98 | <0.0001 |
| Mental illness | 3,473.06 | <0.0001 | 3,920.61 | <0.0001 |
| Chronic conditions | 5,773.75 | <0.0001 | 6,585.36 | <0.0001 |

HMO, health maintenance organization; HRA, health risk assessment; MAT, medication-assisted treatment; OUD, opioid use disorder; PPO, preferred provider organization; SUD, substance use disorder.

Table D3. Predictors of Health Care Costs Among Employees With HRA Data including Family Health**,** Full Model Results

|  |  |  |
| --- | --- | --- |
| **Variable** | **Employees with HRA Data** | **Employees with and without HRA Data** |
| **Total Health Care Costs** | ***P*** | **Total Health Care Costs** | ***P*** |
| Intercept | 1,079.63 | <0.0001 | 483.81 | <0.0001 |
| Male | -875.00 | <0.0001 | –520.43 | <0.0001 |
| Age (yr) |   |   |   |   |
| 18–24 | Reference |   | Reference |   |
| 25–34 | 459.37 | 0.0010 | 418.54 | <0.0001 |
| 35–44 | 1,114.77 | <0.0001 | 961.17 | <0.0001 |
| 45–54 | 2,238.79 | <0.0001 | 2,312.77 | <0.0001 |
| 55–64 | 3,850.98 | <0.0001 | 4,329.89 | <0.0001 |
| Industry |  |   |   |   |
| Oil & gas extraction, mining |  |   | 1,308.85 | <0.0001 |
| Manufacturing, durable goods | -649.43 | <0.0001 | 332.32 | <0.0001 |
| Manufacturing, nondurable goods | -726.95 | <0.0001 | 624.43 | <0.0001 |
| Transportation, communications, utilities | -360.67 | <0.0001 | 629.29 | <0.0001 |
| Retail trade | -1,178.31 |  <0.0001 | 215.24 |  <0.0001 |
| Finance, insurance, real estate | Reference |   | 665.77 |  <0.0001 |
| Services | -126.22 |  0.3189 | 414.91 |  <0.0001 |
| Other/unknown | -598.03 |  0.0735 | Reference |   |
| Plan type |  |  |  |  |
| Generous (PPO) | Reference |  | Reference |  |
| Narrow network (HMO) | -76.27 | 0.4507 | –133.63 |  <0.0001 |
| Consumer–driven (high deductible) | -1,145.80 | <0.0001 | –819.11 | <0.0001 |
| Salary (vs hourly) |  |  |  |  |
| Salary | 109.83 | 0.0348 | -168.00 | <0.0001 |
| Hourly | Reference |  | Reference |  |
| Missing |  |  | 19.37 | 0.3952 |
| Region |   |   |   |   |
| West | 368.35 | <0.0001 | -412.42 | <0.0001 |
| South | 32.76 | 0.6615 | -816.30 | <0.0001 |
| Northeast | Reference |   | Reference |   |
| Midwest | -156.93 | 0.0319 | –826.93 | <0.0001 |
| Family unit |   |   |   |   |
| Spouse only | -140.79 | 0.1680 | –115.71 | <0.0001 |
| Spouse + dependent | -902.54 | <0.0001 | –840.62 | <0.0001 |
| Dependent only | -738.11 | <0.0001 | –676.52 | <0.0001 |
| No spouse or dependent on coverage | Reference |   | Reference |   |
| Employee health |   |   |   |   |
| OUD and no evidence of MAT  | 21,492.85 | <0.0001 | 19,177.87 | <0.0001 |
| OUD and evidence of MAT  | 6,282.36 | <0.0001 | 5,427.38 | <0.0001 |
| Nonopioid SUD | 7,928.56 | <0.0001 | 10,875.98 | <0.0001 |
| Mental illness | 3,414.77 | <0.0001 | 3,920.61 | <0.0001 |
| Chronic conditions | 5,764.79 | <0.0001 | 6,585.36 | <0.0001 |
| Family member health |  |  |  |  |
| Dependent |  |  |  |  |
|  OUD and no evidence of MAT  | -153.89 | 0.8130 | -76.90 | 0.6754 |
|  OUD and evidence of MAT  | 871.85 | 0.1679 | -211.22 | 0.2645 |
|  Nonopioid SUD | 810.25 | 0.0025 | 49.88 | 0.5060 |
|  Mental illness | 491.66 | <0.0001 | 262.34 | <0.0001 |
| Spouse |  |  |  |  |
|  OUD and no evidence of MAT  | 924.55 | 0.0749 | 833.50 | <0.0001 |
|  OUD and evidence of MAT  | -60.25 | 0.9078 | 284.11 | 0.0590 |
|  Nonopioid SUD | -61.12 | 0.8480 | -365.25 | <0.0001 |
|  Mental illness | 370.07 | <0.0001 | 320.59 | <0.0001 |

## **Appendix E.** Sensitivity Analysis

**TABLE E3.** Predictors of Work Productivity Among Employees With HRA Data, Sensitivity Analysis Excluding Health Plan Type

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Lost At-Work Productivity Days, Model 1** | ***P*** | **Lost At-Work Productivity Days, Model 2** | ***P*** |
| Employee health |   |   |   |   |
| OUD and no evidence of MAT  | 14.10 | <0.0001 | 14.35 | <.0001 |
| OUD and evidence of MAT | 1.90 | 0.2639 | 2.01 | 0.2391 |
| Nonopioid SUD  | 4.94 | <0.0001 | 5.09 | <.0001 |
| Mental illness | 5.42 | <0.0001 | 5.49 | <.0001 |
| Chronic conditions | 2.79 | <0.0001 | 2.79 | <.0001 |
| Family member health |   |   |   |   |
| Dependent |  |  |  |  |
| OUD and no evidence of MAT  | –1.02 | 0.6724 | -1.20 | 0.6205 |
| OUD and evidence of MAT  | –0.59 | 0.7798 | -0.81 | 0.7024 |
| Nonopioid SUD | 0.18 | 0.8298 | 0.29 | 0.7234 |
| Mental illness | 0.15 | 0.6149 | 0.17 | 0.5685 |
| Spouse |  |  |  |  |
| OUD and no evidence of MAT  | –1.11 | 0.5247 | -0.77 | 0.6586 |
| OUD and evidence of MAT  | 2.61 | 0.1473 | 2.64 | 0.1425 |
| Nonopioid SUD | 1.22 | 0.2455 | 1.17 | 0.2669 |
| Mental illness | 0.35 | 0.1963 | 0.34 | 0.2136 |

Model 1 is reported in Table 2 of the manuscript and includes the following control variables: age, sex, industry, health plan type, salary/hourly, region, and family unit. Model 2 includes all of the control variables except for health plan type, due to potential collinearity. HRA, health risk assessment; MAT, medication-assisted treatment; OUD, opioid use disorder; PPO, preferred provider organization; SUD, substance use disorder.