## 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, F062  F0630, F0631, F0632, F0633, F0634, F064, F070, F0781, F0789, F079  F09, 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, F333  F3340, 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, F1699  F1810, 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, J0574  J0575, 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.