Appendix

Supplemental Table 1. Risk Ratio (95% CI) estimates for NC I/DD Waiver Benefit from county random intercepts.

| **County** | **Risk Ratio (95% CI)** | **P-value** |
| --- | --- | --- |
| Alamance | 0.92 (0.81, 1.04) | 0.1784 |
| Alexander | 0.82 (0.66, 1.02) | 0.0690 |
| Alleghany | 1.05 (0.83, 1.32) | 0.7084 |
| Anson | 1.12 (0.92, 1.36) | 0.2666 |
| Ashe | 0.91 (0.75, 1.12) | 0.3723 |
| Avery | 0.97 (0.76, 1.24) | 0.8301 |
| Beaufort | 0.76 (0.63, 0.90) | **0.0020** |
| Bertie | 0.73 (0.58, 0.93) | **0.0091** |
| Bladen | 1.02 (0.84, 1.24) | 0.8359 |
| Brunswick | 1.01 (0.88, 1.15) | 0.9038 |
| Buncombe | 1.16 (1.06, 1.27) | **0.0008** |
| Burke | 1.04 (0.92, 1.18) | 0.5189 |
| Cabarrus | 1.11 (0.99, 1.24) | 0.0673 |
| Caldwell | 0.84 (0.72, 0.97) | **0.0216** |
| Camden | 1.11 (0.85, 1.45) | 0.4441 |
| Carteret | 1.14 (0.97, 1.35) | 0.1187 |
| Caswell | 0.90 (0.72, 1.12) | 0.3402 |
| Catawba | 1.01 (0.90, 1.13) | 0.9070 |
| Chatham | 1.05 (0.90, 1.24) | 0.5380 |
| Cherokee | 1.19 (0.99, 1.43) | 0.0592 |
| Chowan | 0.90 (0.72, 1.14) | 0.3881 |
| Clay | 1.04 (0.80, 1.35) | 0.7596 |
| Cleveland | 1.36 (1.23, 1.51) | **<.0001** |
| Columbus | 1.26 (1.10, 1.45) | **0.0013** |
| Craven | 0.95 (0.83, 1.10) | 0.5108 |
| Cumberland | 0.90 (0.81, 0.99) | **0.0254** |
| Currituck | 1.02 (0.82, 1.26) | 0.8830 |
| Dare | 1.04 (0.83, 1.29) | 0.7558 |
| Davidson | 0.91 (0.80, 1.03) | 0.1270 |
| Davie | 1.09 (0.90, 1.32) | 0.3867 |
| Duplin | 1.10 (0.94, 1.30) | 0.2466 |
| Durham | 1.16 (1.06, 1.27) | **0.0015** |
| Edgecombe | 0.80 (0.68, 0.94) | **0.0079** |
| Forsyth | 1.14 (1.05, 1.24) | **0.0023** |
| Franklin | 0.98 (0.82, 1.16) | 0.7819 |
| Gaston | 1.00 (0.90, 1.10) | 0.9272 |
| Gates | 0.92 (0.72, 1.18) | 0.5353 |
| Graham | 1.07 (0.83, 1.38) | 0.6128 |
| Granville | 0.99 (0.83, 1.18) | 0.9274 |
| Greene | 0.93 (0.74, 1.17) | 0.5486 |
| Guilford | 1.06 (0.98, 1.15) | 0.1411 |
| Halifax | 0.81 (0.68, 0.96) | **0.0170** |
| Harnett | 0.87 (0.74, 1.02) | 0.0789 |
| Haywood | 1.02 (0.88, 1.18) | 0.8036 |
| Henderson | 1.05 (0.93, 1.20) | 0.4217 |
| Hertford | 0.73 (0.59, 0.92) | **0.0062** |
| Hoke | 1.08 (0.90, 1.30) | 0.4116 |
| Hyde | 0.87 (0.65, 1.16) | 0.3293 |
| Iredell | 1.17 (1.04, 1.31) | **0.0069** |
| Jackson | 1.12 (0.92, 1.36) | 0.2609 |
| Johnston | 0.74 (0.65, 0.85) | **<.0001** |
| Jones | 0.97 (0.76, 1.23) | 0.7969 |
| Lee | 1.16 (0.97, 1.38) | 0.1051 |
| Lenoir | 0.89 (0.76, 1.04) | 0.1579 |
| Lincoln | 1.07 (0.93, 1.24) | 0.3310 |
| Macon | 1.00 (0.82, 1.22) | 0.9697 |
| Madison | 1.01 (0.82, 1.24) | 0.9242 |
| Martin | 0.86 (0.70, 1.06) | 0.1689 |
| McDowell | 1.08 (0.93, 1.26) | 0.2991 |
| Mecklenburg | 1.14 (1.06, 1.22) | **0.0002** |
| Mitchell | 1.31 (1.05, 1.63) | **0.0148** |
| Montgomery | 1.05 (0.85, 1.30) | 0.6550 |
| Moore | 1.14 (0.98, 1.33) | 0.0931 |
| Nash | 1.01 (0.89, 1.16) | 0.8394 |
| New Hanover | 0.99 (0.89, 1.10) | 0.8674 |
| Northampton | 0.82 (0.65, 1.03) | 0.0913 |
| Onslow | 1.07 (0.95, 1.21) | 0.2468 |
| Orange | 1.17 (1.04, 1.32) | 0.0107 |
| Pamlico | 0.99 (0.77, 1.28) | 0.9645 |
| Pasquotank | 0.89 (0.74, 1.07) | 0.2201 |
| Pender | 1.02 (0.86, 1.21) | 0.7961 |
| Perquimans | 1.01 (0.80, 1.28) | 0.9280 |
| Person | 0.88 (0.74, 1.06) | 0.1770 |
| Pitt | 0.92 (0.82, 1.03) | 0.1288 |
| Polk | 1.32 (1.07, 1.64) | **0.0107** |
| Randolph | 1.00 (0.88, 1.14) | 0.9931 |
| Richmond | 1.00 (0.83, 1.19) | 0.9706 |
| Robeson | 1.03 (0.91, 1.16) | 0.6748 |
| Rockingham | 0.78 (0.67, 0.90) | **0.0010** |
| Rowan | 0.87 (0.77, 1.00) | **0.0461** |
| Rutherford | 1.10 (0.96, 1.27) | 0.1792 |
| Sampson | 1.11 (0.95, 1.29) | 0.1989 |
| Scotland | 1.04 (0.86, 1.26) | 0.6737 |
| Stanly | 0.96 (0.80, 1.14) | 0.6100 |
| Stokes | 0.96 (0.80, 1.15) | 0.6631 |
| Surry | 1.08 (0.93, 1.25) | 0.3138 |
| Swain | 0.97 (0.75, 1.27) | 0.8374 |
| Transylvania | 1.15 (0.94, 1.39) | 0.1677 |
| Tyrrell | 0.97 (0.72, 1.29) | 0.8077 |
| Union | 1.19 (1.06, 1.32) | **0.0020** |
| Vance | 0.81 (0.68, 0.98) | **0.0257** |
| Wake | 1.27 (1.18, 1.36) | **<.0001** |
| Warren | 1.05 (0.85, 1.29) | 0.6437 |
| Washington | 0.79 (0.62, 1.01) | 0.0592 |
| Watauga | 1.03 (0.84, 1.26) | 0.7831 |
| Wayne | 1.01 (0.90, 1.14) | 0.8202 |
| Wilkes | 0.88 (0.75, 1.03) | 0.1109 |
| Wilson | 1.06 (0.92, 1.22) | 0.4065 |
| Yadkin | 1.22 (1.02, 1.46) | **0.0288** |
| Yancey | 1.36 (1.12, 1.65) | **0.0022** |

Supplemental Table 2: ICD-10-CM Codes: Diagnoses of interest and comorbid conditions

|  |  |
| --- | --- |
| Intellectual Disability diagnosis | F70, F71, F72, F73, F78, F79. |
| Autism Spectrum Disorder diagnosis | F84.0, F84.5, F84.8, F84.9 |
| Attention-Deficit/Hyperactivity Disorder | F90.0, F90.1, F90.2, F90.8, F90.9 |
| Schizophrenia Spectrum and Other Psychotic Disorders | F20.0, F20.1, F20.2, F20.3, F20.5, F20.81, F20.89, F20.9, F21, F22, F23, F25.0, F25.1, F25.8, F25.9, F29 |
| Bipolar and related Disorders | F31.0, F31.10, F31.11, F31.12, F31.13, F31.2, F31.30, F31.31, F31.32, F31.4, F31.5, F31.60, F31.61, F31.62, F31.63, F31.64, F31.70, F31.71, F31.72, F31.73, F31.74, F31.75, F31.76, F31.77, F31.78, F31.81, F31.89, F31.9, F34.0 |
| Depressive Disorders | F32.0, F32.1, F32.2, F32.3, F32.4, F32.5, F33.0, F33.1, F33.2, F33.3, F33.40, F33.41, F33.42, F33.8, F33.9, F34.1, N94.3, F32.81, F34.89, F34.9, F32.89, F32.8, F32.9, F39 |
| Disruptive Mood Dysregulation Disorder | F34.8, F34.81 |
| Anxiety Disorders and Obsessive-Compulsive and related Disorders | F93.0, F94.0, F40.218, F40.228, F40.230, F40.231, F40.232, F40.233, F40.248, F40.298, F40.8, F40.9, F40.210, F40.220, F40.240, F40.241, F40.242, F40.243, F40.290, F40.291,  F40.10, F40.11, F41.0, F40.0, F41.1, F41.8, F41.9, F41.3, F42, F42.3, F42.4, L98.1, F42.8, F42.9, F45.22, F63.3 |
| Trauma- and Stress-Related Disorders | F94.1, F94.2, F43.10, F43.0, F43.8, F43.9 |
| Somatic Symptom and Related Disorders | F45.0, F45.1, F45.20, F45.22, F45.29, F45.21, F44.4, F44.5, F44.6, F44.7, F45.4, F45.8, F45.9 |
| Feeding and Eating Disorders | F98.3, F50.8, F98.21, F50.8, F50.82, F50.00, F50.01, F50.02, F50.2, F50.8, F50.89, F50.9 |
| Disruptive, Impulsive-Control, and Conduct Disorders | F91.3, F63.81, F91.0, F91.1, F91.2, F91.9, F91.8, F91.9 |
| Substance-Related and Addictive Disorders | F10.10, F10.20, F10.99, F12.10, F12.20, F12.99,  F16.10, F16.20, F16.99, F18.10, F18.20, F18.99,  F11.10, F11.20, F11.99, F13.10, F13.20, F13.99,  F14.10, F14.20, F14.99, F15.10, F15.20, F15.99,  F17.20, Z72.0, F17.209, F19.10, F19.20, F19.99 |
| Adjustment Disorder | F43.21, F43.22, F43.23, F43.24, F43.25, F43.20 |

Supplemental Table 3. Outcome coding algorithm.

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| --- | --- |
| Outcome | Definition |
| Emergency Department Visit | At least one claim from the institutional or professional file with a CPT/HCPCS in 99281, 99282, 99283, 99284, 99285, 99288 or a revenue code of 0981, 0450, 0451, 0452, 0453, 0454, 0455, 0457, 0458, 0459 |

Supplemental Table 4. Mental health services and treatment CPT codes.

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| --- | --- |
| **Screening codes** | |
| Caregiver-focused health risk assessment | 96161 |
| Developmental screening or testing | 96110-96111 |
| Neurobehavioral status exam | 96116 |
| Brief emotional/behavioral assessment | 96127 |
| Annual depression screening | 99420, G0444 |
| Alcohol and/or substance abuse structured screening and brief intervention services; | 99408, 99409 |
| Adolescent Risks and Strengths Screening | 96160 |
| **Treatment/intervention codes** | |
| *Initial evaluation* |  |
| Psychiatric diagnostic evaluation (with or without medical services) | 90791, 90792 |
| *Other treatment codes* |  |
| Health and behavior interventions individual, family, group | 96152-55 |
| Evaluation and management codes   * Requires psychology or psychiatry taxonomy on the claim (beginning with 2084 or 103T) | 99201-99205  99211-99215  99217  99218-99220  99221-99223  99231-99233  99241-99245  99251-99255  99281-99288  99304-99306  99307-99310  99315-99316  99318  99324-99328  99334-99337  99341-99345  99347-99350  99366  99401-9404  99406-99409  99411-99412 |
| Psychotherapy, 30- 60 minutes | 90382, 90833, 90834, 90836, 90837. 90838 |
| Psychotherapy for crisis | 90839, 90840 |
| Psychoanalysis | 90845 |
| Family psychotherapy with or without patient | 90846, 90847, 90849 |
| Group psychotherapy | 90853 |
| Transcranial magnetic stimulation treatment | 90867-90869 |
| Electroconvulsive therapy | 90870 |
| Psychophysiological therapy with biofeedback | 90875-6 |
| Hypnotherapy | 90880 |
| **ID/D-related Services** |  |
| Assertive Community Treatment Team | H0040 |
| HRI Residential | H0046, S5145, H2020 |
| Child/Adolescent Day Treatment | H2012 |
| Community Support | H2015 |
| Psychosocial Rehabilitation | H2017 |
| Intensive In-Home Services | H2022 |
| Multi-Systemic Therapy | H2033 |
| Transitional Living Skills | H2022 U4 |
| Intensive Recovery Supports | T1012 |
| Personal Care/Individual Support | T1019 |
| Respite | H0045 |
| One Time Transitional Cost | H0043 |
| Supported Employment | H2023 |
| Supported Employment Maintenance | H2026 |
| **NC I/DD Waiver Services** |  |
| Crisis Intervention & Stabilization Supports | H2011 |
| Community Networking | H2015 |
| Residential Supports | H2016 |
| Supported Employment | H2025 |
| Natural Supports Education | S5110 |
| Natural Supports Education – Conference | S5111 |
| Personal Care | S5125 |
| Respite Care | S5150 |
| Home Modifications | S5165 |
| Respite Care Nursing | T1005 |
| In-Home Intensive Supports | T1015 |
| Individual Goods and Services | T1999 |
| Community Living and Supports | T2013 |
| Residential Support Level 2 | T2014 |
| Residential Support Level 3 | T2020 |
| Day Supports | T2021 |
| Specialized Consultative Services | T2025 |
| Day Supports – Developmental Delay | T2027 |
| Assistive Technology – Equipment and Supplies | T2029 |
| Supported Living | T2033 |
| Crisis Services – Out of Home | T2034 |
| Community Transition Supports | T2038 |
| Vehicle Adaptations | T0239 |
| Community Navigator | T2041 |
| **Applied Behavior Analysis** |  |
| Behavior identification assessment | 0359T |
| Observational behavioral follow-up assessment | 0360T, 0361T |
| Exposure behavioral follow-up assessment | 0362T, 0363T |
| Adaptive behavior treatment by protocol | 0364T, 0365T |
| Exposure adaptive behavior treatment by protocol | 0373T, 0374T, 0368T, 0369T |
| Group adaptive behavior treatment by protocol | 0366T, 0367T |
| Adaptive behavior treatment social skills group | 0372T |
| Family adaptive behavior treatment guidance | 0370T |
| Multiple-family group adaptive behavior treatment group | 0371T |
| **Physical/occupational/speech therapy** |  |
| Physical therapy evaluation and treatment | 97001, 97002, 97010-97028, 97032-97039, 97110-97546 |
| Occupational therapy evaluation and treatment | 97003, 97004, 95831, 95832, 95833, 95834, 97750, 97755, 97760, 97761, 97762 |
| Speech language therapy evaluation and treatment | 92507,92508, 92521, 92522, 92523,92524, 92526, 92551, 92597, 92605, 92606, 92607, 92608, 92609, 92610, 92611, 92612, 92626, 92627, 96125, 92630, 92633 |