

**Supplementary Information for**

Disruption to Test Scores after Hurricanes in the United States

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**This PDF file includes:**

Table S1

Table S2

| **State** |  | **Grade** | **2009 percentiles** | | | | | **2018 percentiles** | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Florida |  |  | 5th | 25th | 50th | 75th | 95th | 5th | 25th | 50th | 75th | 95th |
| Mean Standardized Math Score | 3 | 2.71 | 3.08 | 3.33 | 3.67 | 4.14 | 2.84 | 3.50 | 3.82 | 4.13 | 4.50 |
| 4 | 2.93 | 3.87 | 4.11 | 4.51 | 4.81 | 3.68 | 4.08 | 4.48 | 4.81 | 5.46 |
| 5 | 3.71 | 4.60 | 4.89 | 5.25 | 5.70 | 3.88 | 4.63 | 5.15 | 5.49 | 6.12 |
| 6 | 4.88 | 5.34 | 5.83 | 6.31 | 6.93 | 4.91 | 5.53 | 6.17 | 6.73 | 7.37 |
| 7 | 5.54 | 6.28 | 6.65 | 7.17 | 7.84 | 5.15 | 5.93 | 6.75 | 7.37 | 8.18 |
| 8 | 6.21 | 7.21 | 7.65 | 8.12 | 8.79 | 5.70 | 6.78 | 7.39 | 8.12 | 9.20 |
| Mean Standardized RLA Score | 3 | 3.04 | 3.52 | 3.90 | 4.35 | 4.95 | 2.46 | 3.31 | 3.69 | 4.13 | 4.58 |
| 4 | 3.15 | 4.15 | 4.58 | 4.91 | 5.51 | 3.36 | 3.92 | 4.43 | 4.86 | 5.28 |
| 5 | 4.29 | 4.76 | 5.25 | 5.56 | 6.20 | 3.67 | 4.73 | 5.21 | 5.63 | 6.22 |
| 6 | 5.16 | 5.66 | 6.14 | 6.52 | 7.30 | 4.86 | 5.70 | 6.22 | 6.72 | 7.15 |
| 7 | 5.70 | 6.64 | 6.96 | 7.33 | 8.02 | 5.71 | 6.45 | 6.97 | 7.47 | 7.90 |
| 8 | 6.43 | 7.55 | 7.96 | 8.23 | 8.88 | 6.67 | 7.54 | 7.93 | 8.46 | 9.07 |
| Louisiana | Mean Standardized Math Score | 3 | 0.80 | 1.35 | 1.88 | 2.33 | 2.89 | - | - | - | - | - |
| 4 | 2.17 | 2.50 | 2.96 | 3.34 | 3.97 | - | - | - | - | - |
| 5 | 2.74 | 3.39 | 3.78 | 4.25 | 4.91 | 1.68 | 3.34 | 3.90 | 4.40 | 5.12 |
| 6 | 3.94 | 4.47 | 4.92 | 5.47 | 6.14 | 2.48 | 4.15 | 4.78 | 5.52 | 6.11 |
| 7 | 4.60 | 5.34 | 5.95 | 6.49 | 7.39 | 3.97 | 5.01 | 5.80 | 6.32 | 7.04 |
| 8 | 5.56 | 6.60 | 7.15 | 7.61 | 8.29 | 4.32 | 6.02 | 6.72 | 7.30 | 8.25 |
| Mean Standardized RLA Score | 3 | 0.67 | 1.22 | 1.97 | 2.27 | 3.05 | - | - | - | - | - |
| 4 | 1.95 | 2.33 | 2.98 | 3.41 | 4.00 | - | - | - | - | - |
| 5 | 2.67 | 3.35 | 3.82 | 4.38 | 4.92 | 2.08 | 3.51 | 4.11 | 4.73 | 5.41 |
| 6 | 4.04 | 4.54 | 4.99 | 5.41 | 6.10 | 2.62 | 4.56 | 5.06 | 5.69 | 6.36 |
| 7 | 4.63 | 5.53 | 6.12 | 6.48 | 7.08 | 4.20 | 5.52 | 6.28 | 6.74 | 7.46 |
| 8 | 5.65 | 6.59 | 7.17 | 7.48 | 7.98 | 5.76 | 6.64 | 7.13 | 7.72 | 8.74 |
| New Jersey | Mean Standardized Math Score | 3 | 2.50 | 3.03 | 3.51 | 3.82 | 4.19 | 2.82 | 3.14 | 3.43 | 3.99 | 4.48 |
| 4 | 3.78 | 4.07 | 4.54 | 4.94 | 5.50 | 3.72 | 4.01 | 4.51 | 5.10 | 5.73 |
| 5 | 4.46 | 5.08 | 5.64 | 5.93 | 6.93 | 4.61 | 5.26 | 5.54 | 6.29 | 6.82 |
| 6 | 5.63 | 6.14 | 6.81 | 7.31 | 8.14 | 5.60 | 6.17 | 6.68 | 7.28 | 8.06 |
| 7 | 6.63 | 7.19 | 7.91 | 8.33 | 9.21 | 6.68 | 7.05 | 7.55 | 8.37 | 9.33 |
| 8 | 7.92 | 8.43 | 9.00 | 9.48 | 10.23 | 7.64 | 8.15 | 8.62 | 9.34 | 10.50 |
| Mean Standardized RLA Score | 3 | 2.16 | 2.85 | 3.65 | 4.04 | 4.56 | 2.98 | 3.48 | 3.86 | 4.34 | 5.11 |
| 4 | 3.39 | 3.41 | 3.93 | 4.62 | 5.03 | 3.92 | 4.45 | 4.75 | 5.29 | 6.24 |
| 5 | 4.25 | 4.97 | 5.57 | 6.09 | 6.97 | 4.73 | 5.29 | 5.64 | 6.36 | 7.20 |
| 6 | 5.41 | 5.95 | 6.66 | 7.07 | 7.85 | 5.78 | 6.37 | 6.52 | 7.27 | 7.99 |
| 7 | 6.50 | 6.95 | 7.56 | 8.11 | 8.93 | 6.51 | 6.96 | 7.49 | 8.12 | 8.97 |
| 8 | 7.48 | 8.11 | 8.64 | 9.15 | 9.91 | 7.73 | 7.92 | 8.49 | 9.01 | 10.11 |
| North Carolina | Mean Standardized Math Score | 3 | 2.11 | 2.78 | 3.37 | 3.61 | 4.13 | 1.96 | 2.63 | 3.05 | 3.42 | 3.82 |
| 4 | 2.96 | 3.73 | 4.20 | 4.63 | 5.12 | 2.65 | 3.45 | 3.98 | 4.49 | 5.05 |
| 5 | 3.66 | 4.55 | 5.05 | 5.60 | 6.23 | 3.29 | 4.47 | 4.93 | 5.51 | 5.95 |
| 6 | 4.75 | 5.64 | 6.15 | 6.59 | 7.33 | 4.75 | 5.64 | 6.15 | 6.59 | 7.33 |
| 7 | 5.54 | 6.44 | 7.02 | 7.64 | 8.28 | 5.12 | 6.12 | 6.84 | 7.34 | 8.25 |
| 8 | 6.10 | 7.32 | 8.15 | 8.83 | 9.62 | 5.69 | 7.20 | 7.67 | 8.43 | 9.35 |
| Mean Standardized RLA Score | 3 | 1.49 | 2.40 | 2.93 | 3.40 | 3.92 | 1.97 | 2.80 | 3.28 | 3.64 | 4.35 |
| 4 | 2.29 | 3.36 | 3.86 | 4.28 | 5.00 | 3.03 | 3.67 | 4.17 | 4.63 | 5.40 |
| 5 | 3.13 | 4.18 | 4.62 | 5.13 | 5.87 | 3.75 | 3.99 | 4.56 | 5.09 | 5.63 |
| 6 | 4.16 | 5.04 | 5.68 | 6.18 | 6.79 | 4.41 | 5.28 | 5.88 | 6.40 | 7.14 |
| 7 | 4.90 | 5.95 | 6.50 | 7.04 | 7.78 | 5.57 | 6.37 | 6.82 | 7.29 | 8.04 |
| 8 | 5.79 | 6.95 | 7.44 | 8.11 | 8.73 | 6.24 | 7.01 | 7.58 | 8.15 | 8.79 |
| South Carolina | Mean Standardized Math Score | 3 | 0.37 | 1.59 | 2.22 | 2.59 | 3.15 | 0.79 | 1.71 | 2.07 | 2.62 | 3.30 |
| 4 | 1.49 | 2.39 | 3.31 | 3.71 | 4.19 | 1.37 | 2.35 | 2.94 | 3.57 | 4.39 |
| 5 | 1.95 | 3.19 | 4.24 | 4.82 | 5.26 | 2.21 | 3.40 | 3.76 | 4.50 | 5.43 |
| 6 | 3.38 | 5.00 | 5.37 | 5.81 | 6.36 | 3.08 | 4.32 | 4.84 | 5.56 | 6.64 |
| 7 | 4.35 | 5.50 | 6.18 | 6.80 | 7.29 | 3.85 | 5.19 | 6.03 | 6.61 | 7.26 |
| 8 | 5.90 | 6.55 | 7.33 | 7.77 | 8.55 | 5.01 | 6.10 | 7.03 | 7.58 | 8.36 |
| Mean Standardized RLA Score | 3 | 0.59 | 1.51 | 2.12 | 2.71 | 3.32 | 0.06 | 1.31 | 1.85 | 2.47 | 3.41 |
| 4 | 1.29 | 2.30 | 3.03 | 3.68 | 4.22 | 1.12 | 1.99 | 2.76 | 3.69 | 4.36 |
| 5 | 2.38 | 3.01 | 3.93 | 4.63 | 4.99 | 2.08 | 3.14 | 3.62 | 4.53 | 5.41 |
|  | 5th | 25th | 50th | 75th | 95th | 5th | 25th | 50th | 75th | 95th |
| 6 | 2.95 | 4.11 | 4.96 | 5.48 | 5.94 | 3.64 | 4.30 | 4.97 | 5.77 | 6.28 |
| 7 | 3.93 | 5.10 | 5.83 | 6.45 | 6.94 | 4.53 | 5.50 | 6.02 | 6.66 | 7.22 |
| 8 | 5.47 | 5.97 | 6.58 | 7.39 | 7.91 | 5.81 | 6.43 | 7.05 | 7.66 | 8.22 |
| Texas | Mean Standardized Math Score | 3 | 1.47 | 2.27 | 2.68 | 3.01 | 3.65 | 1.80 | 2.47 | 2.98 | 3.33 | 4.08 |
| 4 | 2.34 | 3.22 | 3.67 | 4.04 | 4.68 | 2.31 | 3.15 | 3.73 | 4.25 | 5.06 |
| 5 | 3.66 | 4.31 | 4.81 | 5.19 | 5.91 | 3.14 | 4.11 | 4.73 | 5.16 | 6.24 |
| 6 | 4.57 | 5.45 | 5.85 | 6.33 | 7.08 | 4.13 | 5.02 | 5.63 | 6.13 | 7.43 |
| 7 | 5.55 | 6.47 | 6.96 | 7.40 | 8.21 | - | - | - | - | - |
| 8 | 6.63 | 7.50 | 8.05 | 8.51 | 9.44 | - | - | - | - | - |
| Mean Standardized RLA Score | 3 | 1.25 | 2.09 | 2.63 | 3.02 | 3.86 | 0.93 | 1.80 | 2.33 | 2.76 | 3.60 |
| 4 | 2.08 | 2.89 | 3.28 | 3.68 | 4.47 | 1.81 | 2.78 | 3.25 | 3.71 | 4.53 |
| 5 | 3.02 | 3.96 | 4.44 | 4.84 | 5.54 | 2.88 | 3.60 | 4.13 | 4.52 | 5.43 |
| 6 | 4.09 | 5.08 | 5.45 | 5.90 | 6.55 | 3.76 | 4.65 | 5.06 | 5.43 | 6.54 |
| 7 | 5.17 | 5.85 | 6.34 | 6.75 | 7.45 | 4.86 | 5.61 | 6.14 | 6.64 | 7.53 |
| 8 | 6.19 | 6.91 | 7.34 | 7.70 | 8.39 | 6.02 | 6.75 | 7.18 | 7.63 | 8.55 |

**Table S1.** State-specific mean standardized test scores in math and reading and language arts in 2009 and 2018

| *Variable* | **Math**  (β, 95% CrI, probability) | **Reading/Language Arts**  (β, 95% CrI, probability) |
| --- | --- | --- |
| Storm Exposure Nationally and by State |  |  |
| National | -0.04 (-0.11, 0.03), 85.0% | 0.00 (-0.06, 0.07), 55.5% |
| Florida | 0.14 (0.02, 0.26), 99.0% | 0.11 (0.02, 0.22), 99.2% |
| Louisiana | -0.05 (-0.30, 0.15), 69.9% | 0.00 (-0.15, 0.16), 50.2% |
| New Jersey | -0.11 (-0.31, 0.06), 88.7% | -0.04 (-0.18, 0.09), 71.1% |
| North Carolina | -0.16 (-0.29, -0.03), 99.4% | -0.05 (-0.15, 0.05), 82.4% |
| South Carolina | -0.12 (-0.35, 0.06), 90.0% | -0.01 (-0.15, 0.12), 54.5% |
| Texas | 0.03 (-0.09, 0.16), 66.0% | -0.04 (-0.14, 0.05), 81.2% |
| Grade-Cohort Percent Race/Ethnicity |  |  |
| American Indian/Alaska Native | -1.45 (-2.38, -0.51), 99.9% | -2.02 (-2.84, -1.19), 99.9% |
| Asian | 1.78 (0.70, 2.86), 99.9% | 1.79 (0.86, 2.71), 99.9% |
| Black | -1.71 (-1.93, -1.48), 99.9% | -2.27 (-2.46, -2.07), 99.9% |
| Hispanic | -0.96 (-1.14, -0.78), 99.9% | -1.66 (-1.81, -1.51), 99.9% |
| Percent Grade-Cohort Economically Disadvantaged | -0.49 (-0.59, -0.38), 99.9% | -0.98 (-1.06, -0.89), 99.9% |
| Percent Grade-Cohort Receiving Free Lunch | -0.45 (-0.53, -0.37), 99.9% | 0.02 (-0.05, 0.09), 71.6% |
| Percent County English Language Learners | 0.66 (0.14, 1.19), 99.2% | -1.61 (-2.05, -1.18), 99.9% |
| Percent County Special Education Students | -1.73 (-2.25, -1.20), 99.9% | 0.37 (-0.09, 0.82), 94.6% |
| Percent County College-Educated Adults | 1.64 (1.25, 2.03), 99.9% | 1.44 (1.12, 1.77), 99.9% |
| County Poverty Rate | -0.75 (-1.08, -0.42), 99.9% | 0.33 (0.06, 0.60), 99.4% |
| Percent County Single Mother Households | -0.12 (-0.50, 0.25), 73.5% | -0.27 (-0.57, 0.03), 96.1% |
| Percent County Urban Schools | 0.16 (0.00, 0.32), 97.8% | 0.24 (0.10, 0.38), 99.9% |

**Table S2.** National and State-Specific Associations between Hurricane-Force Tropical Cyclones and Standardized Test Scores; 95% CrI = 95% credible interval, probability = Posterior probability of positive/negative association