Supplemental Materials

*How does adversity relate to performance across different abilities in the same person?*

This document contains seven parts. First, we provide correlations and descriptive statistics for all indicators used to create aggregate variables for harshness and unpredictability. Second, we provide full regression tables for the primary results. Third, we provide full results for the first set of secondary analyses. Fourth, we provide figures for both primary and secondary analyses where WJ scores are uncentered. Note that these analyses are the same, however, centering WJ scores allows for better visual comparison of each subtest slope. The uncentered scores retain visual information about mean differences in performance across subtest types. Fifth, we provide correlations between WJ subtests over time. Sixth, we provide background and a causal inference discussion regarding statistical controls. We then use this discussion to frame the various issues with controlling for average income in our income variability analyses. Next, we describe our analytic approach to controlling for average income and provide a figure of results for the income variability analyses with and without average income controls. Finally, we provide full regression results for each of these analyses.

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## Correlations Among All Harshness and Unpredictability Indicators

| **Supplemental Table 1a. Correlations and descriptive statistics among all harshness indicators.** |
| --- |
| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1. Family Income Disadvantage | - | 1138 | 1138 | 1138 | 1138 | 1138 | 1138 | 1138 |
| 2. Neigh. Socioeconomic Disadvantage |  0.45\*\* | - | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 |
| 3. Neigh. % Poverty |  0.38\*\* |  0.90\*\* | - | 1139 | 1139 | 1139 | 1139 | 1139 |
| 4. Neigh. HH Income |  0.54\*\* |  0.83\*\* |  0.69\*\* | - | 1139 | 1139 | 1139 | 1139 |
| 5. Neigh. Gini |  0.23\*\* |  0.79\*\* |  0.75\*\* |  0.60\*\* | - | 1139 | 1139 | 1139 |
| 6. Neigh. % Renting |  0.27\*\* |  0.64\*\* |  0.53\*\* |  0.50\*\* |  0.42\*\* | - | 1139 | 1139 |
| 7. Neigh. % Unemploy |  0.22\*\* |  0.65\*\* |  0.52\*\* |  0.35\*\* |  0.34\*\* |  0.32\*\* | - | 1139 |
| 8. Neigh. % No Degree |  0.39\*\* |  0.68\*\* |  0.57\*\* |  0.60\*\* |  0.43\*\* |  0.10\*\* |  0.36\*\* | - |
| N | 1154 | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 |
| Mean | -3.52 | -0.02 | 13.24 | -36687.79 | 0.38 | 33.56 | 3.23 | 19.76 |
| SD | 2.68 | 0.74 | 11.26 | 15267.95 | 0.06 | 19.13 | 2.26 | 13.24 |
| Min | -23.79 | -1.95 | 0.00 | -125415.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| Median | -2.87 | -0.10 | 9.88 | -33750.00 | 0.37 | 31.09 | 2.79 | 16.85 |
| Max | -0.17 | 3.35 | 76.64 | -5578.00 | 0.68 | 99.47 | 21.50 | 77.26 |
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| **Supplemental Table 1b. Correlations and descriptive statistics among all unpredictability indicators.** |
| --- |
| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. Fam. Transitions | - | 1153 | 1139 | 1153 | 1146 | 1140 | 1146 | 1146 | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 |
| 2. Partner Changes |  0.73\*\* | - | 1137 | 1153 | 1146 | 1140 | 1146 | 1146 | 1137 | 1137 | 1137 | 1137 | 1137 | 1137 | 1137 |
| 3. Job Changes |  0.74\*\* |  0.39\*\* | - | 1137 | 1131 | 1125 | 1131 | 1131 | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 |
| 4. Res. Moves |  0.62\*\* |  0.13\*\* |  0.16\*\* | - | 1146 | 1140 | 1146 | 1146 | 1137 | 1137 | 1137 | 1137 | 1137 | 1137 | 1137 |
| 5. Income (SD) | -0.11\*\* | -0.04  | -0.08\*\* | -0.11\*\* | - | 1140 | 1146 | 1146 | 1131 | 1131 | 1131 | 1131 | 1131 | 1131 | 1131 |
| 6. Income (Residual SD) | -0.10\*\* | -0.04  | -0.09\*\* | -0.08\*\* |  0.95\*\* | - | 1140 | 1140 | 1125 | 1125 | 1125 | 1125 | 1125 | 1125 | 1125 |
| 7. Income (% Change) |  0.29\*\* |  0.23\*\* |  0.21\*\* |  0.17\*\* |  0.16\*\* |  0.19\*\* | - | 1146 | 1131 | 1131 | 1131 | 1131 | 1131 | 1131 | 1131 |
| 8. Income (CV) |  0.38\*\* |  0.33\*\* |  0.28\*\* |  0.19\*\* |  0.33\*\* |  0.32\*\* |  0.63\*\* | - | 1131 | 1131 | 1131 | 1131 | 1131 | 1131 | 1131 |
| 9. Neigh. SE (SD) |  0.44\*\* |  0.23\*\* |  0.60\*\* |  0.09\*\* | -0.06\*  | -0.06  |  0.09\*\* |  0.19\*\* | - | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 |
| 10. Neigh. % Poverty (SD) |  0.39\*\* |  0.22\*\* |  0.49\*\* |  0.11\*\* | -0.08\*\* | -0.07\*  |  0.10\*\* |  0.23\*\* |  0.84\*\* | - | 1139 | 1139 | 1139 | 1139 | 1139 |
| 11. Neigh. HH Income (SD) |  0.22\*\* |  0.09\*\* |  0.37\*\* | -0.01  |  0.04  |  0.04  |  0.02  |  0.01  |  0.72\*\* |  0.46\*\* | - | 1139 | 1139 | 1139 | 1139 |
| 12. Neigh. Gini (SD) |  0.36\*\* |  0.18\*\* |  0.50\*\* |  0.08\*  | -0.07\*  | -0.06\*  |  0.07\*  |  0.17\*\* |  0.84\*\* |  0.73\*\* |  0.53\*\* | - | 1139 | 1139 | 1139 |
| 13. Neigh. % Renting (SD) |  0.33\*\* |  0.16\*\* |  0.48\*\* |  0.05  | -0.06  | -0.06\*  |  0.06\*  |  0.12\*\* |  0.81\*\* |  0.57\*\* |  0.61\*\* |  0.62\*\* | - | 1139 | 1139 |
| 14. Neigh. % Unemploy (SD) |  0.36\*\* |  0.19\*\* |  0.45\*\* |  0.10\*\* | -0.06\*  | -0.06\*  |  0.09\*\* |  0.16\*\* |  0.74\*\* |  0.57\*\* |  0.36\*\* |  0.52\*\* |  0.49\*\* | - | 1139 |
| 15. Neigh. % No Degree (SD) |  0.41\*\* |  0.22\*\* |  0.54\*\* |  0.09\*\* | -0.06  | -0.06\*  |  0.09\*\* |  0.20\*\* |  0.79\*\* |  0.63\*\* |  0.45\*\* |  0.59\*\* |  0.53\*\* |  0.54\*\* | - |
| N | 1155 | 1153 | 1139 | 1153 | 1146 | 1140 | 1146 | 1146 | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 | 1139 |
| Mean | 0.04 | 0.45 | 1.24 | 1.61 | 1.11 | 1.02 | 0.59 | 0.36 | 0.02 | 4.06 | 4813.56 | 0.03 | 9.64 | 1.04 | 4.45 |
| SD | 0.71 | 1.04 | 1.49 | 1.27 | 1.17 | 1.10 | 0.83 | 0.23 | 0.80 | 6.33 | 7226.06 | 0.04 | 12.30 | 1.51 | 5.95 |
| Min | -0.82 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Median | -0.15 | 0.00 | 1.00 | 1.50 | 0.82 | 0.74 | 0.35 | 0.31 | -0.11 | 0.87 | 1412.80 | 0.01 | 3.24 | 0.36 | 1.48 |
| Max | 3.86 | 10.00 | 11.00 | 10.00 | 17.78 | 14.39 | 12.16 | 1.97 | 3.09 | 40.98 | 68115.60 | 0.24 | 69.25 | 10.23 | 46.36 |
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## Full Family Income Disadvantage Results

| **Supplemental Table 2. Full model results for Family Income Disadvantage.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.10 (0.27) |  0.01 [-0.03, 0.04] | 0.716 | 0.000 |
| Child Race Ethnicity | -2.94 (0.36) | -0.15 [-0.19, -0.12] | 0.000 | 1.000 |
| Maternal Education |  3.87 (0.33) |  0.26 [ 0.21, 0.30] | 0.000 | 1.000 |
| Family IncomeDisadvantage | -1.51 (0.33) | -0.10 [-0.14, -0.06] | 0.000 | 0.509 |
| Applied Problems | -0.84 (0.26) | -0.06 [-0.09, -0.02] | 0.003 | 0.005 |
| Calculations | -0.45 (0.27) | -0.03 [-0.07, 0.01] | 0.117 | 0.000 |
| Auditory Processing |  2.20 (0.27) |  0.15 [ 0.11, 0.18] | 0.000 | 0.995 |
| Letter-Word Pronunciation | -0.19 (0.26) | -0.01 [-0.05, 0.02] | 0.456 | 0.000 |
| Auditory-Visual Associations |  1.20 (0.27) |  0.08 [ 0.05, 0.11] | 0.000 | 0.126 |
| Short-Term Memory | -0.62 (0.26) | -0.04 [-0.08, -0.01] | 0.028 | 0.000 |
| Picture Vocab | -1.24 (0.26) | -0.08 [-0.12, -0.05] | 0.000 | 0.154 |
| Passage Comprehension | -0.33 (0.27) | -0.02 [-0.06, 0.01] | 0.240 | 0.000 |
| Verbal Analogies | -0.45 (0.27) | -0.03 [-0.07, 0.00] | 0.117 | 0.000 |
| Unfamiliar Words |  0.73 (0.27) |  0.05 [ 0.01, 0.08] | 0.013 | 0.002 |
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| **Supplemental Table 3. Simple Effects for Family Income Disadvantage.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems | -2.35 [-3.16, -1.53] | 0.000 | 0.979 |
| Calculations | -1.96 [-2.78, -1.13] | 0.000 | 0.859 |
| Auditory Processing |  0.69 [-0.14, 1.53] | 0.116 | 0.029 |
| Letter-Word Pronunciation | -1.70 [-2.52, -0.88] | 0.000 | 0.685 |
| Auditory-Visual Associations | -0.31 [-1.14, 0.52] | 0.461 | 0.002 |
| Short-Term Memory | -2.13 [-2.95, -1.31] | 0.000 | 0.934 |
| Picture Vocab | -2.74 [-3.56, -1.93] | 0.000 | 0.999 |
| Passage Comprehension | -1.84 [-2.66, -1.01] | 0.000 | 0.787 |
| Verbal Analogies | -1.96 [-2.79, -1.13] | 0.000 | 0.861 |
| Unfamiliar Words | -0.78 [-1.61, 0.05] | 0.080 | 0.045 |
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## Full Neighborhood Disadvantage Results

| **Supplemental Table 4. Full model results for Neighborhood Socioeconomic Disadvantage.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.16 (0.28) |  0.01 [-0.03, 0.05] | 0.570 | 0.000 |
| Child Race Ethnicity | -2.48 (0.39) | -0.13 [-0.17, -0.09] | 0.000 | 0.994 |
| Maternal Education |  4.16 (0.30) |  0.27 [ 0.24, 0.31] | 0.000 | 1.000 |
| Neigh. SocioeconomicDisadvantage | -1.57 (0.32) | -0.11 [-0.15, -0.06] | 0.000 | 0.581 |
| Applied Problems | -0.89 (0.26) | -0.06 [-0.09, -0.03] | 0.001 | 0.010 |
| Calculations | -0.64 (0.27) | -0.04 [-0.08, -0.01] | 0.028 | 0.001 |
| Auditory Processing |  1.94 (0.27) |  0.13 [ 0.10, 0.17] | 0.000 | 0.951 |
| Letter-Word Pronunciation |  0.28 (0.26) |  0.02 [-0.02, 0.05] | 0.368 | 0.000 |
| Auditory-Visual Associations |  1.74 (0.26) |  0.12 [ 0.08, 0.15] | 0.000 | 0.815 |
| Short-Term Memory | -0.19 (0.26) | -0.01 [-0.05, 0.02] | 0.470 | 0.000 |
| Picture Vocab | -1.02 (0.26) | -0.07 [-0.10, -0.03] | 0.000 | 0.032 |
| Passage Comprehension | -0.22 (0.27) | -0.01 [-0.05, 0.02] | 0.459 | 0.000 |
| Verbal Analogies | -1.28 (0.27) | -0.09 [-0.12, -0.05] | 0.000 | 0.205 |
| Unfamiliar Words |  0.28 (0.26) |  0.02 [-0.02, 0.05] | 0.368 | 0.000 |
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| **Supplemental Table 5. Simple Effects for Neighborhood Socioeconomic Disadvantage.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems | -2.46 [-3.26, -1.65] | 0.000 | 0.990 |
| Calculations | -2.21 [-3.02, -1.39] | 0.000 | 0.954 |
| Auditory Processing |  0.37 [-0.44, 1.19] | 0.410 | 0.003 |
| Letter-Word Pronunciation | -1.29 [-2.09, -0.48] | 0.002 | 0.301 |
| Auditory-Visual Associations |  0.17 [-0.64, 0.99] | 0.681 | 0.001 |
| Short-Term Memory | -1.75 [-2.56, -0.95] | 0.000 | 0.731 |
| Picture Vocab | -2.58 [-3.39, -1.78] | 0.000 | 0.996 |
| Passage Comprehension | -1.78 [-2.60, -0.96] | 0.000 | 0.751 |
| Verbal Analogies | -2.84 [-3.67, -2.02] | 0.000 | 0.999 |
| Unfamiliar Words | -1.29 [-2.10, -0.47] | 0.002 | 0.305 |
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## Full Family Transitions Results

| **Supplemental Table 6. Full model results for Family Transitions.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.17 (0.28) |  0.01 [-0.03, 0.05] | 0.546 | 0.000 |
| Child Race Ethnicity | -3.11 (0.36) | -0.16 [-0.20, -0.13] | 0.000 | 1.000 |
| Maternal Education |  4.54 (0.30) |  0.30 [ 0.26, 0.34] | 0.000 | 1.000 |
| Family Transitions | -0.32 (0.29) | -0.02 [-0.06, 0.02] | 0.266 | 0.000 |
| Applied Problems | -0.58 (0.26) | -0.04 [-0.07, -0.01] | 0.059 | 0.000 |
| Calculations | -1.07 (0.27) | -0.07 [-0.11, -0.04] | 0.001 | 0.052 |
| Auditory Processing |  0.78 (0.26) |  0.05 [ 0.02, 0.09] | 0.010 | 0.003 |
| Letter-Word Pronunciation |  0.07 (0.26) |  0.00 [-0.03, 0.04] | 0.795 | 0.000 |
| Auditory-Visual Associations |  0.97 (0.26) |  0.07 [ 0.03, 0.10] | 0.001 | 0.022 |
| Short-Term Memory | -0.14 (0.26) | -0.01 [-0.04, 0.02] | 0.743 | 0.000 |
| Picture Vocab | -0.48 (0.25) | -0.03 [-0.07, 0.00] | 0.102 | 0.000 |
| Passage Comprehension | -0.15 (0.26) | -0.01 [-0.05, 0.03] | 0.743 | 0.000 |
| Verbal Analogies |  0.08 (0.27) |  0.01 [-0.03, 0.04] | 0.795 | 0.000 |
| Unfamiliar Words |  0.51 (0.26) |  0.04 [ 0.00, 0.07] | 0.098 | 0.000 |
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| **Supplemental Table 7. Simple Effects for Family Transitions.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems | -0.90 [-1.66, -0.14] | 0.098 | 0.060 |
| Calculations | -1.39 [-2.16, -0.62] | 0.004 | 0.391 |
| Auditory Processing |  0.45 [-0.31, 1.22] | 0.351 | 0.004 |
| Letter-Word Pronunciation | -0.26 [-1.02, 0.50] | 0.593 | 0.001 |
| Auditory-Visual Associations |  0.65 [-0.12, 1.42] | 0.240 | 0.015 |
| Short-Term Memory | -0.46 [-1.22, 0.30] | 0.351 | 0.004 |
| Picture Vocab | -0.80 [-1.55, -0.04] | 0.127 | 0.034 |
| Passage Comprehension | -0.47 [-1.24, 0.30] | 0.351 | 0.004 |
| Verbal Analogies | -0.25 [-1.02, 0.53] | 0.593 | 0.001 |
| Unfamiliar Words |  0.19 [-0.58, 0.96] | 0.627 | 0.000 |
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## Full Neighborhood Socioeconomic Variability

| **Supplemental Table 8. Full model results for Neighborhood Socioeconomic Variability.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.18 (0.28) |  0.01 [-0.02, 0.05] | 0.518 | 0.000 |
| Child Race Ethnicity | -3.19 (0.37) | -0.17 [-0.20, -0.13] | 0.000 | 1.000 |
| Maternal Education |  4.62 (0.29) |  0.31 [ 0.27, 0.34] | 0.000 | 1.000 |
| Neigh. SocioeconomicVariability | -0.04 (0.29) | -0.00 [-0.04, 0.04] | 0.888 | 0.000 |
| Applied Problems | -0.45 (0.26) | -0.03 [-0.06, 0.00] | 0.274 | 0.000 |
| Calculations | -0.65 (0.27) | -0.04 [-0.08, -0.01] | 0.078 | 0.001 |
| Auditory Processing |  0.31 (0.27) |  0.02 [-0.01, 0.06] | 0.506 | 0.000 |
| Letter-Word Pronunciation |  0.22 (0.26) |  0.01 [-0.02, 0.05] | 0.635 | 0.000 |
| Auditory-Visual Associations |  0.73 (0.27) |  0.05 [ 0.01, 0.08] | 0.059 | 0.002 |
| Short-Term Memory |  0.20 (0.26) |  0.01 [-0.02, 0.05] | 0.635 | 0.000 |
| Picture Vocab | -0.38 (0.26) | -0.03 [-0.06, 0.01] | 0.375 | 0.000 |
| Passage Comprehension | -0.09 (0.27) | -0.01 [-0.04, 0.03] | 0.830 | 0.000 |
| Verbal Analogies | -0.05 (0.27) | -0.00 [-0.04, 0.03] | 0.860 | 0.000 |
| Unfamiliar Words |  0.16 (0.27) |  0.01 [-0.02, 0.05] | 0.685 | 0.000 |
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| **Supplemental Table 9. Simple Effects for Neighborhood Socioeconomic Variability.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems | -0.49 [-1.25, 0.27] | 0.674 | 0.005 |
| Calculations | -0.70 [-1.47, 0.08] | 0.397 | 0.021 |
| Auditory Processing |  0.27 [-0.51, 1.04] | 0.824 | 0.001 |
| Letter-Word Pronunciation |  0.18 [-0.58, 0.94] | 0.824 | 0.000 |
| Auditory-Visual Associations |  0.69 [-0.08, 1.46] | 0.397 | 0.020 |
| Short-Term Memory |  0.16 [-0.60, 0.92] | 0.824 | 0.000 |
| Picture Vocab | -0.42 [-1.17, 0.34] | 0.704 | 0.003 |
| Passage Comprehension | -0.13 [-0.90, 0.64] | 0.824 | 0.000 |
| Verbal Analogies | -0.09 [-0.87, 0.69] | 0.824 | 0.000 |
| Unfamiliar Words |  0.12 [-0.65, 0.89] | 0.824 | 0.000 |
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## Full Average Percent Change

| **Supplemental Table 10. Full model results for Family Income Percent Change.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.19 (0.28) |  0.01 [-0.02, 0.05] | 0.499 | 0.000 |
| Child Race Ethnicity | -3.19 (0.37) | -0.17 [-0.21, -0.13] | 0.000 | 1.000 |
| Maternal Education |  4.61 (0.29) |  0.31 [ 0.27, 0.34] | 0.000 | 1.000 |
| Average Percent Change |  0.20 (0.29) |  0.01 [-0.02, 0.05] | 0.475 | 0.000 |
| Applied Problems | -0.32 (0.26) | -0.02 [-0.06, 0.01] | 0.378 | 0.000 |
| Calculations |  0.52 (0.27) |  0.03 [-0.00, 0.07] | 0.143 | 0.000 |
| Auditory Processing |  0.66 (0.27) |  0.04 [ 0.01, 0.08] | 0.075 | 0.001 |
| Letter-Word Pronunciation |  0.01 (0.26) |  0.00 [-0.03, 0.04] | 0.961 | 0.000 |
| Auditory-Visual Associations |  0.53 (0.27) |  0.04 [ 0.00, 0.07] | 0.143 | 0.000 |
| Short-Term Memory | -0.15 (0.26) | -0.01 [-0.04, 0.02] | 0.641 | 0.000 |
| Picture Vocab | -0.80 (0.26) | -0.05 [-0.09, -0.02] | 0.024 | 0.004 |
| Passage Comprehension | -0.17 (0.27) | -0.01 [-0.05, 0.02] | 0.641 | 0.000 |
| Verbal Analogies | -0.49 (0.27) | -0.03 [-0.07, 0.00] | 0.143 | 0.000 |
| Unfamiliar Words |  0.21 (0.27) |  0.01 [-0.02, 0.05] | 0.631 | 0.000 |
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| **Supplemental Table 11. Simple Effects for Family Income Percent Change.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems | -0.11 [-0.88, 0.65] | 0.928 | 0.000 |
| Calculations |  0.73 [-0.06, 1.51] | 0.230 | 0.026 |
| Auditory Processing |  0.86 [ 0.09, 1.64] | 0.230 | 0.053 |
| Letter-Word Pronunciation |  0.22 [-0.54, 0.98] | 0.820 | 0.000 |
| Auditory-Visual Associations |  0.73 [-0.04, 1.50] | 0.230 | 0.025 |
| Short-Term Memory |  0.06 [-0.70, 0.82] | 0.928 | 0.000 |
| Picture Vocab | -0.59 [-1.35, 0.17] | 0.319 | 0.009 |
| Passage Comprehension |  0.04 [-0.75, 0.82] | 0.928 | 0.000 |
| Verbal Analogies | -0.29 [-1.07, 0.49] | 0.782 | 0.001 |
| Unfamiliar Words |  0.41 [-0.36, 1.18] | 0.592 | 0.003 |
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## Full Coefficient of Variation

| **Supplemental Table 12. Full model results for Family Income Coefficient of Variation.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.21 (0.28) |  0.01 [-0.02, 0.05] | 0.439 | 0.000 |
| Child Race Ethnicity | -3.00 (0.37) | -0.16 [-0.20, -0.12] | 0.000 | 1.000 |
| Maternal Education |  4.45 (0.30) |  0.30 [ 0.26, 0.33] | 0.000 | 1.000 |
| Coefficient of Variation | -0.48 (0.30) | -0.03 [-0.07, 0.01] | 0.117 | 0.000 |
| Applied Problems | -0.60 (0.26) | -0.04 [-0.07, -0.01] | 0.044 | 0.000 |
| Calculations | -0.24 (0.27) | -0.02 [-0.05, 0.02] | 0.457 | 0.000 |
| Auditory Processing |  1.20 (0.27) |  0.08 [ 0.05, 0.12] | 0.000 | 0.131 |
| Letter-Word Pronunciation |  0.20 (0.26) |  0.01 [-0.02, 0.05] | 0.498 | 0.000 |
| Auditory-Visual Associations |  0.91 (0.27) |  0.06 [ 0.03, 0.10] | 0.002 | 0.014 |
| Short-Term Memory |  0.26 (0.26) |  0.02 [-0.02, 0.05] | 0.457 | 0.000 |
| Picture Vocab | -0.74 (0.26) | -0.05 [-0.08, -0.02] | 0.011 | 0.002 |
| Passage Comprehension | -0.18 (0.27) | -0.01 [-0.05, 0.02] | 0.498 | 0.000 |
| Verbal Analogies | -1.20 (0.27) | -0.08 [-0.12, -0.05] | 0.000 | 0.137 |
| Unfamiliar Words |  0.40 (0.27) |  0.03 [-0.01, 0.06] | 0.218 | 0.000 |
|   |
|   |

| **Supplemental Table 13. Simple Effects for Family Income Coefficient of Variation.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems | -1.08 [-1.86, -0.29] | 0.024 | 0.145 |
| Calculations | -0.72 [-1.52, 0.08] | 0.153 | 0.027 |
| Auditory Processing |  0.72 [-0.07, 1.52] | 0.153 | 0.028 |
| Letter-Word Pronunciation | -0.28 [-1.06, 0.50] | 0.605 | 0.001 |
| Auditory-Visual Associations |  0.44 [-0.36, 1.23] | 0.403 | 0.004 |
| Short-Term Memory | -0.22 [-1.00, 0.57] | 0.652 | 0.001 |
| Picture Vocab | -1.22 [-2.00, -0.43] | 0.011 | 0.239 |
| Passage Comprehension | -0.66 [-1.45, 0.14] | 0.174 | 0.019 |
| Verbal Analogies | -1.68 [-2.48, -0.88] | 0.000 | 0.672 |
| Unfamiliar Words | -0.07 [-0.87, 0.72] | 0.856 | 0.000 |
|   |
|   |

## Supplemental Figure 1

![](data:application/pdf;base64...)

## Supplemental Figure 2

![](data:application/pdf;base64...)

## WJ Subtest Correlations Across Time

| Passage Comprehension | 1 | 2 | 3 |
| --- | --- | --- | --- |
| 1. Grade 3 | - |  |  |
| 2. Grade 5 |  0.75\*\* | - |  |
| 3. Age 15 |  0.66\*\* |  0.67\*\* | - |

| Picture Vocab | 1 | 2 | 3 | 4 | 5 |
| --- | --- | --- | --- | --- | --- |
| 1. 54 month | - |  |  |  |  |
| 2. Grade 1 |  0.67\*\* | - |  |  |  |
| 3. Grade 3 |  0.63\*\* |  0.72\*\* | - |  |  |
| 4. Grade 5 |  0.61\*\* |  0.69\*\* |  0.79\*\* | - |  |
| 5. Age 15 |  0.61\*\* |  0.70\*\* |  0.75\*\* |  0.81\*\* | - |

| Calculations | 1 | 2 |
| --- | --- | --- |
| 1. Grade 3 | - |  |
| 2. Grade 5 |  0.65\*\* | - |

| Verbal Analogies | 1 | 2 |
| --- | --- | --- |
| 1. Grade 3 | - |  |
| 2. Age 15 |  0.65\*\* | - |

| Letter-Word Pronunciation | 1 | 2 | 3 | 4 |
| --- | --- | --- | --- | --- |
| 1. 54 month | - |  |  |  |
| 2. Grade 1 |  0.56\*\* | - |  |  |
| 3. Grade 3 |  0.51\*\* |  0.77\*\* | - |  |
| 4. Grade 5 |  0.50\*\* |  0.66\*\* |  0.85\*\* | - |

| Short-Term Memory | 1 | 2 | 3 |
| --- | --- | --- | --- |
| 1. 54 month | - |  |  |
| 2. Grade 1 |  0.57\*\* | - |  |
| 3. Grade 3 |  0.56\*\* |  0.77\*\* | - |

| Applied Problems | 1 | 2 | 3 | 4 | 5 |
| --- | --- | --- | --- | --- | --- |
| 1. 54 month | - |  |  |  |  |
| 2. Grade 1 |  0.64\*\* | - |  |  |  |
| 3. Grade 3 |  0.58\*\* |  0.70\*\* | - |  |  |
| 4. Grade 5 |  0.56\*\* |  0.71\*\* |  0.76\*\* | - |  |
| 5. Age 15 |  0.50\*\* |  0.64\*\* |  0.65\*\* |  0.73\*\* | - |

| Auditory Processing | 1 | 2 |
| --- | --- | --- |
| 1. 54 month | - |  |
| 2. Grade 1 |  0.37\*\* | - |

| Unfamiliar Words | 1 | 2 |
| --- | --- | --- |
| 1. Grade 1 | - |  |
| 2. Grade 3 |  0.72\*\* | - |

| Auditory-Visual Associations | 1 | 2 |
| --- | --- | --- |
| 1. Grade 1 | - |  |
| 2. Grade 3 |  0.63\*\* | - |

## Alternative Causal Models of Harshness, Unpredictability, and Cognitive Performance

It is important to realize that the appropriateness of analyzing multiple adversity dimensions in one model depends on an underlying causal model (Cinelli et al., 2022; Rohrer, 2018). There are several possible causal models for how each adversity dimension relates to the other and to the outcome.

In cases where each adversity dimension is independent (non-causally related) and each affects the outcome, the only (potential) benefit to adding each to the same model is estimation precision (see figure below). For example, imagine income disadvantage and unpredictability do not cause each other but they both independently affect WJ performance. Including both in the model may improve model estimation but they would not change qualitative conclusions of modeling them separately (assuming each truly affect the outcome).



However, this quickly becomes tricky if each adversity dimension has a slightly different causal structure. For example, if income disadvantage causes both unpredictability and WJ performance (i.e., is a confounder), then estimating the effect of unpredictability requires controlling for income disadvantage. Yet, estimating the effect of income disadvantage is biased when controlling for unpredictability because unpredictability is a mediator for income disadvantage (orange path). Controlling for mediators eliminates the indirect effect of the variable of interest. Including both in the model removes bias for one variable but adds it to the other.



In cases where one adversity dimension affects the other but only one affects the outcome, adding both to the model decreases estimation precision. For example, imagine income disadvantage causes unpredictability (but not WJ performance) and unpredictability affects WJ performance. Adding income disadvantage to the model will bias the estimate of unpredictability.



With limited knowledge about the true causal model and the complexity of our underlying model (e.g., interactions with dummy-coded WJ subtests), we deemed it wiser to model each adversity dimension one at time (however, see income variability analyses below).

## Income Variability Analyses Controlling for Average Income

Whether or not controlling for harshness (e.g., average income) will help remove bias depends on the underlying causal model. Thus, if theory says harshness causes unpredictability and cognitive performance, then statistically controlling for average income will remove bias in the estimate of the effect of income variability. However, there are other plausible models (see above) that do not situate harshness (e.g., average income) as a confound and which, therefore, do not require including it as a covariate. In our opinion, there is no strong evidence that harshness is a confound between unpredictability and cognitive performance. In fact, theoretically and conceptually, the two are often cast as orthogonal, where environments can be low and high in one or both, and have independent effects on outcomes.



In addition, a statistical correlation between average income and income variability does not automatically mean average income is a confound. Note that both variables – average income and income variability – come from the same source of information (income-to-needs over time). Their correlation is more likely an artifact of measurement scale (e.g., a ratio scale with a meaningful zero) than from a causal association between harshness and unpredictability.



Our second set of secondary analyses report models using standard deviation and residual standard deviation in family income. We conduct two analyses with each. First, we included the main effect of average family income in the model. Second, we included the interaction between average family income and WJ subtest category. Importantly, we never included an interaction between average income and income variability, like other work has done (e.g., Li et al., 2018). Doing so tests a different research question: whether or not the effect of average income depends on income variability (or vice versa). This is not the focus of the current nor does it appropriately remove bias of average income in the main effect of unpredictability (if harshness is a confound according to an underlying causal model). Below is are the formulas that distinguish each (other controls not shown):

## No Controls
WJ\_performance = income\_sd \* wj\_subtest + (1|id))

## Controlling the main effect
WJ\_performance = income\_avg + (income\_sd \* wj\_subtest) + (1|id))

## Controlling both the main effect and the simple effect
WJ\_performance = (income\_avg \* wj\_subtest) + (income\_sd \* wj\_subtest) + (1|id)

Controlling for the main effect of average family income adjusts the main effect of income variability, not each simple effect of WJ subtest (see Supplemental Figure 3). Our analyses revealed that doing so changes the overall effect of income standard deviation from a positive (no control) to a negative effect (with control). This makes more sense when considering the average family income and neighborhood disadvantage analyses, which show more harshness exposure is associated with reduced overall performance. However, when examining the simple effects, the effect of income variability on auditory visual associations (orange points and lines) and auditory processing (gray points and lines) are negative, which are exactly opposite of the average family income analyses (see Supplemental Figure 3).

In analyses where the 2-way interaction between average family income and WJ test category are entered, the effect trends the same way as average income analyses, although all effects are now non-significant and practically equivalent to the overall effect. This is more in-line with the harshness analyses. Both of these patterns are essentially the same when applied to the Residual Standard Deviation version of income variability.

## Income Variability with and without controls figure

![](data:application/pdf;base64...)

## Full Family Income Standard Deviation Results - no controls

| **Supplemental Table 14. Full model results for Family Income Variability (SD) - no controls.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.15 (0.28) |  0.01 [-0.03, 0.05] | 0.589 | 0.000 |
| Child Race Ethnicity | -3.14 (0.36) | -0.16 [-0.20, -0.13] | 0.000 | 1.000 |
| Maternal Education |  4.38 (0.29) |  0.29 [ 0.25, 0.33] | 0.000 | 1.000 |
| Standard Deviation |  0.74 (0.28) |  0.05 [ 0.01, 0.09] | 0.008 | 0.003 |
| Applied Problems |  0.35 (0.25) |  0.02 [-0.01, 0.06] | 0.318 | 0.000 |
| Calculations |  0.34 (0.26) |  0.02 [-0.01, 0.06] | 0.318 | 0.000 |
| Auditory Processing | -1.09 (0.26) | -0.08 [-0.11, -0.04] | 0.000 | 0.055 |
| Letter-Word Pronunciation |  0.33 (0.25) |  0.02 [-0.01, 0.06] | 0.318 | 0.000 |
| Auditory-Visual Associations | -0.91 (0.26) | -0.06 [-0.10, -0.03] | 0.003 | 0.011 |
| Short-Term Memory |  0.56 (0.25) |  0.04 [ 0.00, 0.07] | 0.097 | 0.000 |
| Picture Vocab |  0.58 (0.25) |  0.04 [ 0.01, 0.08] | 0.097 | 0.000 |
| Passage Comprehension |  0.06 (0.26) |  0.00 [-0.03, 0.04] | 0.811 | 0.000 |
| Verbal Analogies | -0.12 (0.26) | -0.01 [-0.04, 0.03] | 0.752 | 0.000 |
| Unfamiliar Words | -0.11 (0.26) | -0.01 [-0.04, 0.03] | 0.752 | 0.000 |
|   |
|   |

| **Supplemental Table 15. Simple Effects for Family Income Variability (SD) - no controls.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems |  1.09 [ 0.36, 1.83] | 0.022 | 0.140 |
| Calculations |  1.08 [ 0.34, 1.83] | 0.022 | 0.137 |
| Auditory Processing | -0.35 [-1.09, 0.40] | 0.578 | 0.001 |
| Letter-Word Pronunciation |  1.07 [ 0.33, 1.81] | 0.022 | 0.126 |
| Auditory-Visual Associations | -0.17 [-0.92, 0.58] | 0.818 | 0.000 |
| Short-Term Memory |  1.30 [ 0.56, 2.03] | 0.009 | 0.293 |
| Picture Vocab |  1.32 [ 0.59, 2.06] | 0.009 | 0.319 |
| Passage Comprehension |  0.80 [ 0.06, 1.55] | 0.131 | 0.033 |
| Verbal Analogies |  0.62 [-0.13, 1.37] | 0.285 | 0.011 |
| Unfamiliar Words |  0.63 [-0.12, 1.38] | 0.285 | 0.011 |
|   |
|   |

## Full Family Income Standard Deviation Results - main effect control

| **Supplemental Table 16. Full model results for Family Income Variability (SD) - main effect control.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.15 (0.27) |  0.01 [-0.03, 0.05] | 0.587 | 0.000 |
| Child Race Ethnicity | -2.88 (0.36) | -0.15 [-0.19, -0.11] | 0.000 | 1.000 |
| Maternal Education |  3.74 (0.33) |  0.25 [ 0.21, 0.29] | 0.000 | 1.000 |
| Standard Deviation | -0.32 (0.38) | -0.02 [-0.07, 0.03] | 0.407 | 0.001 |
| Applied Problems |  0.35 (0.25) |  0.02 [-0.01, 0.06] | 0.318 | 0.000 |
| Calculations |  0.34 (0.26) |  0.02 [-0.01, 0.06] | 0.318 | 0.000 |
| Auditory Processing | -1.09 (0.26) | -0.08 [-0.11, -0.04] | 0.000 | 0.055 |
| Letter-Word Pronunciation |  0.33 (0.25) |  0.02 [-0.01, 0.06] | 0.318 | 0.000 |
| Auditory-Visual Associations | -0.91 (0.26) | -0.06 [-0.10, -0.03] | 0.003 | 0.011 |
| Short-Term Memory |  0.55 (0.25) |  0.04 [ 0.00, 0.07] | 0.097 | 0.000 |
| Picture Vocab |  0.58 (0.25) |  0.04 [ 0.01, 0.07] | 0.097 | 0.000 |
| Passage Comprehension |  0.06 (0.26) |  0.00 [-0.03, 0.04] | 0.811 | 0.000 |
| Verbal Analogies | -0.12 (0.26) | -0.01 [-0.04, 0.03] | 0.752 | 0.000 |
| Unfamiliar Words | -0.11 (0.26) | -0.01 [-0.04, 0.03] | 0.752 | 0.000 |
|   |
|   |

| **Supplemental Table 17. Simple Effects for Family Income Variability (SD) - main effect control.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems |  0.04 [-0.86, 0.93] | 0.978 | 0.001 |
| Calculations |  0.03 [-0.87, 0.93] | 0.978 | 0.001 |
| Auditory Processing | -1.40 [-2.31, -0.50] | 0.022 | 0.417 |
| Letter-Word Pronunciation |  0.01 [-0.88, 0.91] | 0.978 | 0.001 |
| Auditory-Visual Associations | -1.23 [-2.13, -0.32] | 0.034 | 0.276 |
| Short-Term Memory |  0.24 [-0.66, 1.14] | 0.785 | 0.003 |
| Picture Vocab |  0.27 [-0.63, 1.16] | 0.785 | 0.003 |
| Passage Comprehension | -0.25 [-1.16, 0.65] | 0.785 | 0.003 |
| Verbal Analogies | -0.43 [-1.34, 0.47] | 0.578 | 0.010 |
| Unfamiliar Words | -0.42 [-1.33, 0.48] | 0.578 | 0.010 |
|   |
|   |

## Full Family Income Standard Deviation Results - main effect + simple effect control

| **Supplemental Table 18. Full model results for Family Income SD - main + simple effect control.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.14 (0.27) |  0.01 [-0.03, 0.05] | 0.602 | 0.000 |
| Child Race Ethnicity | -2.89 (0.36) | -0.15 [-0.19, -0.11] | 0.000 | 1.000 |
| Maternal Education |  3.75 (0.33) |  0.25 [ 0.21, 0.29] | 0.000 | 1.000 |
| Standard Deviation | -0.28 (0.38) | -0.02 [-0.07, 0.03] | 0.455 | 0.001 |
| Applied Problems | -0.45 (0.35) | -0.03 [-0.08, 0.02] | 0.318 | 0.001 |
| Calculations |  0.09 (0.36) |  0.01 [-0.04, 0.05] | 0.811 | 0.000 |
| Auditory Processing |  0.80 (0.36) |  0.06 [ 0.01, 0.11] | 0.097 | 0.028 |
| Letter-Word Pronunciation |  0.36 (0.35) |  0.03 [-0.02, 0.07] | 0.461 | 0.001 |
| Auditory-Visual Associations | -0.19 (0.36) | -0.01 [-0.06, 0.04] | 0.752 | 0.000 |
| Short-Term Memory |  0.22 (0.35) |  0.02 [-0.03, 0.06] | 0.733 | 0.000 |
| Picture Vocab | -0.47 (0.35) | -0.03 [-0.08, 0.02] | 0.318 | 0.002 |
| Passage Comprehension | -0.32 (0.36) | -0.02 [-0.07, 0.03] | 0.531 | 0.000 |
| Verbal Analogies | -0.74 (0.36) | -0.05 [-0.10, -0.00] | 0.117 | 0.016 |
| Unfamiliar Words |  0.69 (0.36) |  0.05 [-0.00, 0.10] | 0.148 | 0.012 |
|   |
|   |

| **Supplemental Table 19. Simple Effects for Family Income SD - main + simple effect control.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems | -0.74 [-1.75, 0.28] | 0.359 | 0.070 |
| Calculations | -0.20 [-1.22, 0.83] | 0.849 | 0.006 |
| Auditory Processing |  0.52 [-0.52, 1.55] | 0.578 | 0.032 |
| Letter-Word Pronunciation |  0.07 [-0.94, 1.09] | 0.978 | 0.003 |
| Auditory-Visual Associations | -0.47 [-1.50, 0.55] | 0.578 | 0.025 |
| Short-Term Memory | -0.07 [-1.09, 0.95] | 0.978 | 0.003 |
| Picture Vocab | -0.75 [-1.77, 0.26] | 0.359 | 0.074 |
| Passage Comprehension | -0.60 [-1.63, 0.42] | 0.530 | 0.043 |
| Verbal Analogies | -1.02 [-2.05, 0.00] | 0.168 | 0.180 |
| Unfamiliar Words |  0.41 [-0.62, 1.43] | 0.658 | 0.018 |
|   |
|   |

## Full Family Income Residual Standard Deviation Results - no controls

| **Supplemental Table 20. Full model results for Family Income Residual SD - no control.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.18 (0.28) |  0.01 [-0.02, 0.05] | 0.520 | 0.000 |
| Child Race Ethnicity | -3.16 (0.36) | -0.17 [-0.20, -0.13] | 0.000 | 1.000 |
| Maternal Education |  4.42 (0.29) |  0.29 [ 0.26, 0.33] | 0.000 | 1.000 |
| ResidualStandard Deviation |  0.59 (0.28) |  0.04 [ 0.00, 0.08] | 0.036 | 0.001 |
| Applied Problems |  0.24 (0.25) |  0.02 [-0.02, 0.05] | 0.534 | 0.000 |
| Calculations |  0.34 (0.26) |  0.02 [-0.01, 0.06] | 0.351 | 0.000 |
| Auditory Processing | -0.98 (0.26) | -0.07 [-0.10, -0.03] | 0.002 | 0.021 |
| Letter-Word Pronunciation |  0.38 (0.25) |  0.03 [-0.01, 0.06] | 0.313 | 0.000 |
| Auditory-Visual Associations | -0.83 (0.26) | -0.06 [-0.09, -0.02] | 0.011 | 0.005 |
| Short-Term Memory |  0.42 (0.26) |  0.03 [-0.01, 0.06] | 0.282 | 0.000 |
| Picture Vocab |  0.65 (0.25) |  0.04 [ 0.01, 0.08] | 0.056 | 0.000 |
| Passage Comprehension |  0.06 (0.26) |  0.00 [-0.03, 0.04] | 0.874 | 0.000 |
| Verbal Analogies | -0.09 (0.26) | -0.01 [-0.04, 0.03] | 0.874 | 0.000 |
| Unfamiliar Words | -0.20 (0.26) | -0.01 [-0.05, 0.02] | 0.588 | 0.000 |
|   |
|   |

| **Supplemental Table 21. Simple Effects for Family Income Residual SD - no control.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems |  0.83 [ 0.09, 1.57] | 0.104 | 0.038 |
| Calculations |  0.93 [ 0.18, 1.68] | 0.075 | 0.068 |
| Auditory Processing | -0.39 [-1.14, 0.35] | 0.482 | 0.002 |
| Letter-Word Pronunciation |  0.96 [ 0.22, 1.70] | 0.065 | 0.077 |
| Auditory-Visual Associations | -0.24 [-0.99, 0.51] | 0.694 | 0.000 |
| Short-Term Memory |  1.01 [ 0.27, 1.75] | 0.057 | 0.097 |
| Picture Vocab |  1.23 [ 0.49, 1.97] | 0.016 | 0.241 |
| Passage Comprehension |  0.64 [-0.11, 1.39] | 0.279 | 0.012 |
| Verbal Analogies |  0.50 [-0.25, 1.25] | 0.388 | 0.004 |
| Unfamiliar Words |  0.39 [-0.36, 1.14] | 0.482 | 0.002 |
|   |
|   |

## Full Family Income Residual Standard Deviation Results - main effect control

| **Supplemental Table 22. Full model results for Family Income Residual SD - main effect control.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.19 (0.27) |  0.01 [-0.02, 0.05] | 0.495 | 0.000 |
| Child Race Ethnicity | -2.87 (0.36) | -0.15 [-0.19, -0.11] | 0.000 | 1.000 |
| Maternal Education |  3.67 (0.33) |  0.24 [ 0.20, 0.29] | 0.000 | 1.000 |
| ResidualStandard Deviation | -0.53 (0.37) | -0.04 [-0.09, 0.01] | 0.149 | 0.004 |
| Applied Problems |  0.24 (0.25) |  0.02 [-0.02, 0.05] | 0.534 | 0.000 |
| Calculations |  0.34 (0.26) |  0.02 [-0.01, 0.06] | 0.351 | 0.000 |
| Auditory Processing | -0.98 (0.26) | -0.07 [-0.10, -0.03] | 0.002 | 0.021 |
| Letter-Word Pronunciation |  0.38 (0.25) |  0.03 [-0.01, 0.06] | 0.313 | 0.000 |
| Auditory-Visual Associations | -0.83 (0.26) | -0.06 [-0.09, -0.02] | 0.011 | 0.005 |
| Short-Term Memory |  0.42 (0.26) |  0.03 [-0.01, 0.06] | 0.282 | 0.000 |
| Picture Vocab |  0.65 (0.25) |  0.04 [ 0.01, 0.08] | 0.056 | 0.000 |
| Passage Comprehension |  0.06 (0.26) |  0.00 [-0.03, 0.04] | 0.874 | 0.000 |
| Verbal Analogies | -0.09 (0.26) | -0.01 [-0.04, 0.03] | 0.874 | 0.000 |
| Unfamiliar Words | -0.20 (0.26) | -0.01 [-0.05, 0.02] | 0.588 | 0.000 |
|   |
|   |

| **Supplemental Table 23. Simple Effects for Family Income Residual SD - main effect control.** |
| --- |
|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems | -0.29 [-1.16, 0.59] | 0.694 | 0.003 |
| Calculations | -0.19 [-1.07, 0.70] | 0.815 | 0.002 |
| Auditory Processing | -1.51 [-2.39, -0.63] | 0.016 | 0.508 |
| Letter-Word Pronunciation | -0.16 [-1.03, 0.72] | 0.839 | 0.001 |
| Auditory-Visual Associations | -1.36 [-2.24, -0.47] | 0.026 | 0.375 |
| Short-Term Memory | -0.11 [-0.99, 0.77] | 0.863 | 0.001 |
| Picture Vocab |  0.12 [-0.76, 0.99] | 0.863 | 0.001 |
| Passage Comprehension | -0.47 [-1.36, 0.41] | 0.482 | 0.011 |
| Verbal Analogies | -0.62 [-1.50, 0.27] | 0.365 | 0.026 |
| Unfamiliar Words | -0.73 [-1.61, 0.16] | 0.279 | 0.043 |
|   |
|   |

## Full Family Income Residual Standard Deviation Results - main effect + simple effect control

| **Supplemental Table 24. Full model results for Family Income Residual SD - main + simple effect control.** |
| --- |
|  | *b*  | *B* [95% CI] | *p* | ROPE *p* |
| Sex Assigned at Birth |  0.18 (0.27) |  0.01 [-0.02, 0.05] | 0.508 | 0.000 |
| Child Race Ethnicity | -2.88 (0.36) | -0.15 [-0.19, -0.11] | 0.000 | 1.000 |
| Maternal Education |  3.68 (0.33) |  0.25 [ 0.20, 0.29] | 0.000 | 1.000 |
| ResidualStandard Deviation | -0.51 (0.37) | -0.04 [-0.09, 0.02] | 0.170 | 0.003 |
| Applied Problems | -0.56 (0.34) | -0.04 [-0.09, 0.01] | 0.282 | 0.003 |
| Calculations |  0.10 (0.35) |  0.01 [-0.04, 0.05] | 0.874 | 0.000 |
| Auditory Processing |  0.79 (0.35) |  0.06 [ 0.01, 0.10] | 0.095 | 0.021 |
| Letter-Word Pronunciation |  0.43 (0.34) |  0.03 [-0.02, 0.08] | 0.372 | 0.001 |
| Auditory-Visual Associations | -0.07 (0.35) | -0.00 [-0.05, 0.04] | 0.874 | 0.000 |
| Short-Term Memory |  0.01 (0.34) |  0.00 [-0.05, 0.05] | 0.979 | 0.000 |
| Picture Vocab | -0.27 (0.34) | -0.02 [-0.07, 0.03] | 0.588 | 0.000 |
| Passage Comprehension | -0.29 (0.35) | -0.02 [-0.07, 0.03] | 0.588 | 0.000 |
| Verbal Analogies | -0.65 (0.35) | -0.05 [-0.09, 0.00] | 0.231 | 0.007 |
| Unfamiliar Words |  0.51 (0.35) |  0.04 [-0.01, 0.08] | 0.313 | 0.002 |
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| **Supplemental Table 25. Simple Effects for Family Income Residual SD - main + simple effect control.** |
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|  | *b* [95% CI] | *p* | ROPE *p* |
| Applied Problems | -1.06 [-2.04, -0.08] | 0.114 | 0.191 |
| Calculations | -0.40 [-1.40, 0.59] | 0.609 | 0.015 |
| Auditory Processing |  0.29 [-0.70, 1.28] | 0.709 | 0.008 |
| Letter-Word Pronunciation | -0.08 [-1.06, 0.90] | 0.906 | 0.002 |
| Auditory-Visual Associations | -0.57 [-1.57, 0.42] | 0.482 | 0.034 |
| Short-Term Memory | -0.50 [-1.49, 0.49] | 0.489 | 0.023 |
| Picture Vocab | -0.78 [-1.76, 0.20] | 0.279 | 0.074 |
| Passage Comprehension | -0.80 [-1.79, 0.19] | 0.279 | 0.083 |
| Verbal Analogies | -1.16 [-2.15, -0.16] | 0.098 | 0.249 |
| Unfamiliar Words |  0.00 [-0.99, 1.00] | 0.997 | 0.002 |
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