**SUPPLEMENTAL MATERIAL**

**Definition of Delinquency measure:** The delinquency measure in the NLSY enquires into the following areas (https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/crime/crime-delinquency-antisocial-behavior#child).

1. Stayed out later than their parents said they could
2. Hurt someone badly enough to need a doctor
3. Lied to their parents about something important
4. Taken something from a store without paying
5. Damaged school property intentionally
6. Gotten drunk
7. Had to bring parents to school about something wrong
8. Skipped school without permission
9. Stayed out at least one night without permission

The above are measured as yes (1) or no (0). We further developed two sets of dimension scores by summing the individual behaviors, after setting missing values to zero (Frick et al, 1993; Rodgers, Buster & Rowe, 2001). The first set of 4 dimensions include property violations (Items 3 and 4), aggression (Items 2 and 5), status violations (Item 6) and oppositional (Items 1,7,8 and 9). Property violations and aggression were subsequently combined into destructive delinquent behaviors, while status violations and oppositional behaviors were combined to form non-destructive delinquent behaviors.

**Additional Details on HOME variables:** The emotional support subscale of HOME reports various aspects (both interviewed and observed) of the mother’s emotional relationship with the child including verbal and physical affection, while cognitive stimulation reports the quality of cognitive stimulation that the child receives such as being read to (<https://www.nlsinfo.org/usersvc/Child-Young-Adult/ParcelMenaghanHOME1989.pdf>).

**FIGURE I: DISTRIBUTION OF SAMPLE BY YEAR OF BIRTH**

****

**Additional Details on Robustness Checks and Exploratory Analysis:**

To ensure the robustness of our results, we replicated the results with two other levels of depreciation—30% and 70% decrease in family income. These results, presented in Section II, are qualitatively similar to those with a 50% level, with smaller effects (as expected) at the 30% level. Using a continuous measure of income decline did not substantively change our main inferences. Controlling for parental relationship status (including parental separation during the first 3 years of life and not being in a two-parent family), maternal education and birth weight, including individuals whose family income returned to only 75% of pre-TID levels within three years or dropping subjects with imputed data did not qualitatively change our results (Section III). Limiting the analysis to children born before 1997 slightly weakened the statistical significance of the results, but the magnitudes of the effects remained very close to our baseline estimates (Section III).

We then performed an exploratory analysis of long-term associations and heterogeneity in our results (Section IV). With regard to long-term associations, we found a significant association between TID at infancy and the probability of engaging in delinquent behavior between 15 and 18 years of age. On average, the probability of a youth exposed to TID at infancy engaging in such behavior was 0.043 higher compared to a youth not exposed to TID at infancy (62.4% vs 66.7%). We found a strong positive association between TID at infancy and self-reported depression but not with the total CESD scores. In particular, the probability of a youth exposed to TID at infancy reporting being depressed was 0.041 higher compared to a youth not exposed to TID at infancy (18.3% vs. 22.4%).

Turning to exploring heterogeneity in our results, with regards to the role of contemporary home emotional support and cognitive stimulation, without controlling for intra-familial effects (Section IV), relative to the effect of TID on the bottom quartile of HOME emotional and cognitive stimulation scores, the additionaleffect of TID on the top three quartiles was significantly negative (*p* < 0.05). HOME emotional stimulation, but not cognitive stimulation, scores had a moderating effect on behavioral impairment scores, particularly externalizing behavior scores. With regards to the heterogeneous effects of family income, we found the effects to be much higher in magnitude for children in the low income (those in the lowest quartile of income in the year before birth) and high income (those in the highest quartile of income in the year before birth) categories than for those in the middle category. For instance, the coefficient on total BPI for the children at the ends of the family income distribution was nearly 4.4–4.5 times that for the children in the middle category. We also examined and found that being in a two-parent family did not moderate the association between TID at infancy and the outcome variables (Section IV). We found no significant moderating effect of a child’s age or gender on the association (Section IV), with the exception of internalizing BPI scores which was negatively moderated by age.

**SECTION I: TID EFFECTS AT DIFFERENT AGES**

**Table I: Average impact of exposure to TID at different ages on cognitive and behavioral outcomes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **0-2 Years** | **3-5 Years** | **0-2 Years** | **3-5 Years** |
|  | **Combined Regression$** | **Individual Regressions#** |
| **PIAT** |  |  |  |  |
| Math | -0.82(0.26) | 0.27(0.73) | -0.78(0.40) | -0.38(0.71) |
| Reading | -1.09(0.15) | 0.85(0.31) | -1.33(0.17) | -0.07(0.95) |
| **Behavior Problem Index** |  |  |  |  |
| Externalizing | 21.32\*(0.01) | -6.45(0.44) | 24.61\*(0.01) | 3.52(0.67) |
| Internalizing | 10.85(0.13) | -5.60(0.47) | 17.81(0.05) | 7.71(0.44) |
| Total | 20.32\*(0.01) | -7.03(0.40) | 25.56\*(0.01) | 4.72(0.88) |

\*: p<0.05; $: Estimates from a single regression containing the two age-group dummy variables (0-2 and 3-5). Wald tests of coefficient equality between these age groups were rejected at or below the 5% level for Externalizing and Total BPI ; #: Estimates from two separate regressions of the two age-group dummy variables, with the sample limited to children who had been exposed to *TID* only at that age group (0-2 or 3-5) and children who had never been exposed to any *TID*.

**SECTION II: TID AT INFANCY RESULTS USING ALTERNATIVE TID DEFINITIONS**

**Table I: Using TID Defined as a 30% Drop in Income: The differential effect of exposure to TID in the first 3 years of age on cognitive and behavioral outcomes. This table reports the association between exposure to TID and the probability of being in a specific distribution of the outcome variable.**

|  |  |  |
| --- | --- | --- |
|  | **MEAN EFFECT** | **EFFECT OVER THE DISTRIBUTION****Probability of being in the:** |
|  |  |  | **Lowest 25%** |  | **Highest 25%**  |  |
| **PIAT** |  |  |  |  |  |  |
| Math | -1.29(0.12) |  | 0.00(0.68) |  | -0.03(0.03) |  |
| Reading | -0.81(0.38) |  | 0.00(0.83) |  | -0.01(0.33) |  |
| **Behavior Problem Index** |  |  |  |  |  |  |
| Externalizing | 6.62(0.44) |  | -0.00(0.78) |  | 0.01(0.57) |  |
| Internalizing | 10.95(0.17) |  | 0.01(0.57) |  | 0.03(0.03) |  |
| Total | 8.86(0.31) |  | -0.01(0.63) |  | 0.02(0.19) |  |

 **Table II: Using TID Defined as a 70% Drop in Income: The differential effect of exposure to TID in the first 3 years of age on cognitive and behavioral outcomes. This table reports the association between exposure to TID and the probability of being in a specific distribution of the outcome variable.**

|  |  |  |
| --- | --- | --- |
|  | **MEAN EFFECT** | **EFFECT OVER THE DISTRIBUTION****Probability of being in the:** |
|  |  |  | **Lowest 25%** |  | **Highest 25%**  |  |
| **PIAT** |  |  |  |  |  |  |
| Math | -0.20(0.86) |  | 0.01(0.70) |  | 0.00(0.78) |  |
| Reading | -0.05(0.97) |  | -0.01(0.46) |  | -0.01(0.68) |  |
| **Behavior Problem Index** |  |  |  |  |  |  |
| Externalizing | 25.81(0.02) |  | -0.02(0.12) |  | 0.04(0.02) |  |
| Internalizing | 18.86(0.08) |  | 0.01(0.49) |  | 0.04(0.03) |  |
| Total | 27.06(0.02) |  | -0.02(0.14) |  | 0.05\*(0.00) |  |

(\* indicate significant at or lower than 5% level Benjamini- Hochberg- Yekutieli corrected)

 **Table III: Using the Percentage Change in Income as a Continuous Variable: The coefficient on the change in income is presented.**

|  |  |  |
| --- | --- | --- |
|  | **MEAN EFFECT** | **EFFECT OVER THE DISTRIBUTION****Probability of being in the:** |
|  |  |  | **Lowest 25%** |  | **Highest 25%**  |  |
| **PIAT** |  |  |  |  |  |  |
| Math | 1.40(0.25) |  | -0.01(0.47) |  | 0.02(0.30) |  |
| Reading | 1.59(0.21) |  | -0.01(0.78) |  | 0.02(0.30) |  |
| **Behavior Problem Index** |  |  |  |  |  |  |
| Externalizing | -28.09(0.03) |  | 0.03(0.13) |  | -0.04(0.03) |  |
| Internalizing | -20.16(0.08) |  | 0.01(0.62) |  | -0.04(0.02) |  |
| Total | -29.65(0.02) |  | 0.03(0.09) |  | -0.06\*(0.00) |  |

(\* indicate significant at or lower than 5% level Benjamini- Hochberg- Yekutieli corrected)

**SECTION III: TID AT INFANCY RESULTS**

 **(ROBUSTNESS CHECKS)**

**Table I: Baseline Analysis: Estimates after controlling for being in a two-parent family and parental separation.**

|  |  |  |
| --- | --- | --- |
|  | **Control for not two-parent family** | **Control for parental separation** |
| **PIAT** |  |  |
| Math | 7.64(0.42) | -0.85(0.38) |
| Reading | -0.31(0.75) | -0.53(0.60) |
| **Behavior Problem Index** |  |  |
| Externalizing | 22.53\*(0.03) | 28.11\*(0.01) |
| Internalizing | 7.64(0.42) | 15.81(0.09) |
| Total | 20.79\*(0.05) | 27.04\*(0.01) |

The coefficients and p-values presented above refer to the coefficient on TID in the same regression specifications as those in Table 2 of the main text, except that they include a control for not being in a two parent family or for parental separation in the first three years of life; \* indicate significant at or lower than 5% level, Benjamini- Hochberg- Yekutieli corrected.

**Table II: Controlling for Mother’s Education and Birthweight. The differential effect of exposure to TID in the first 3 years of age on cognitive and behavioral outcomes. This table reports the association between exposure to TID and the probability of being in a specific distribution of the outcome variable.**

|  |  |  |
| --- | --- | --- |
|  | **MEAN EFFECT** | **EFFECT OVER THE DISTRIBUTION****Probability of being in the:** |
|  |  |  | **Lowest 25%** |  | **Highest 25%**  |  |
| **PIAT** |  |  |  |  |  |  |
| Math | -0.32(0.73) |  | 0.00(0.93) |  | -0.01(0.55) |  |
| Reading | -0.76(0.43) |  | -0.00(0.81) |  | -0.02(0.22) |  |
| **Behavior Problem Index** |  |  |  |  |  |  |
| Externalizing | 26.12(0.01) |  | -0.02(0.12) |  | 0.04(0.02) |  |
| Internalizing | 17.29(0.07) |  | -0.00(0.95) |  | 0.03(0.05) |  |
| Total | 26.72(0.01) |  | -0.03(0.06) |  | 0.05\*(0.00) |  |

(\* indicate significant at or lower than 5% level Benjamini- Hochberg- Yekutieli corrected)

**Table III: Alternate Definition of Transience (Post-TID Income Levels Reach at Least 75% of Pre-birth Income Levels). The differential effect of exposure to TID in the first 3 years of age on cognitive and behavioral outcomes. This table reports the association between exposure to TID and the probability of being in a specific distribution of the outcome variable.**

|  |  |  |
| --- | --- | --- |
|  | **MEAN EFFECT** | **EFFECT OVER THE DISTRIBUTION****Probability of being in the:** |
|  |  |  | **Lowest 25%** |  | **Highest 25%**  |  |
| **PIAT** |  |  |  |  |  |  |
| Math | -0.74(0.42) |  | 0.01(0.63) |  | -0.01(0.43) |  |
| Reading | -1.40(0.15) |  | -0.00(0.97) |  | -0.02(0.10) |  |
| **Behavior Problem Index** |  |  |  |  |  |  |
| Externalizing | 20.86(0.03) |  | -0.01(0.35) |  | 0.03(0.02) |  |
| Internalizing | 15.24(0.09) |  | 0.00(0.75) |  | 0.03(0.05) |  |
| Total | 21.89(0.03) |  | -0.02(0.19) |  | 0.04\*(0.00) |  |

(\* indicate significant at or lower than 5% level Benjamini- Hochberg- Yekutieli corrected)

**Table IV: Excluding Subjects with Imputed Data. The differential effect of exposure to TID in the first 3 years of age on cognitive and behavioral outcomes. This table reports the association between exposure to TID and the probability of being in a specific distribution of the outcome variable.**

|  |  |  |
| --- | --- | --- |
|  | **MEAN EFFECT** | **EFFECT OVER THE DISTRIBUTION****Probability of being in the:** |
|  |  |  | **Lowest 25%** |  | **Highest 25%**  |  |
| **PIAT** |  |  |  |  |  |  |
| Math | -0.83(0.40) |  | 0.00(0.75) |  | -0.01(0.54) |  |
| Reading | -0.98(0.35) |  | -0.01(0.71) |  | -0.02(0.09) |  |
| **Behavior Problem Index** |  |  |  |  |  |  |
| Externalizing | 25.02\*(0.02) |  | -0.02(0.10) |  | 0.04\*(0.02) |  |
| Internalizing | 18.40(0.06) |  | 0.00(0.93) |  | 0.03(0.05) |  |
| Total | 25.85\*(0.01) |  | -0.03(0.04) |  | 0.05\*(0.00) |  |

(\* indicate significant at or lower than 5% level Benjamini- Hochberg- Yekutieli corrected)

**Table V: Using Data Only Before 1997. The differential effect of exposure to TID in the first 3 years of age on cognitive and behavioral outcomes. This table reports the association between exposure to TID and the probability of being in a specific distribution of the outcome variable.**

|  |  |  |
| --- | --- | --- |
|  | **MEAN EFFECT** | **EFFECT OVER THE DISTRIBUTION****Probability of being in the:** |
|  |  |  | **Lowest 25%** |  | **Highest 25%**  |  |
| **PIAT** |  |  |  |  |  |  |
| Math | -0.74(0.44) |  | 0.01(0.69) |  | -0.03(0.28) |  |
| Reading | -1.38(0.17) |  | -0.00(0.84) |  | -0.01(0.08) |  |
| **Behavior Problem Index** |  |  |  |  |  |  |
| Externalizing | 20.89(0.04) |  | -0.01(0.34) |  | 0.03(0.05) |  |
| Internalizing | 15.25(0.10) |  | 0.01(0.64) |  | 0.03(0.05) |  |
| Total | 21.40(0.04) |  | -0.02(0.20) |  | 0.04\*(0.01) |  |

(\* indicate significant at or lower than 5% level Benjamini- Hochberg- Yekutieli corrected)

**SECTION IV: TID AT INFANCY RESULTS**

**EXPLORATORY ANALYSES**

**(LONG-TERM ASSOCIATIONS AND POTENTIAL HETEROGENEITY)**

**Table Ia: Effect on Longer-term Outcomes.**

|  |  |
| --- | --- |
|  | **Coefficient on TID** |
| Delinquency | 0.04\*(0.01) |
| CESD | 2.15(0.07) |
| Self-reported Depression | 0.04\*(0.01) |

The coefficients and p-values presented above refer to the coefficient on TID on dummy variables for whether the youth engaged in any of the nine delinquent behaviors (Delinquency) or reported being depressed (Self-reported Depression) or the percentile of the total CESD score (CESD); \* indicate significant at or lower than 5% level.

**Table Ib: Effect on Dimensional Delinquency Scores and Individual Delinquent Behaviors**

|  |  |
| --- | --- |
| **Dimensional Delinquency Score** | **Coefficient on TID** |
| Property Violations | 0.02 (0.33)  |
| Aggression | 0.02 (0.21) |
| Status Violations | 0.03\* (0.01) |
| Oppositional | 0.05 (0.17) |
| Destructive  | 0.04 (0.16) |
| Non-destructive | 0.08 (0.05) |
| **Individual Delinquent Behaviors** |  |
| Hurt somebody badly enough to need a doctor | 0.01 (0.60) |
| Lied to parents about something important | 0.03 (0.21) |
| Taken something from a store without paying | 0.02 (0.11) |
| Damaged school property intentionally | 0.02 (0.04) |
| Stayed out later than their parents said they could | 0.03 (0.23) |
| Gotten drunk | 0.06\* (0.00) |
| Had to bring parents to school about something wrong | 0.01 (0.47) |
| Skipped school without permission | 0.05\* (0.00) |
| Stayed out at least one night without permission | -0.00 (0.84) |

**Table II: Baseline Analysis: Effect of the interaction between contemporary HOME subscales on the association between exposure to TID during infancy and outcome variables.**

|  |  |  |
| --- | --- | --- |
|  | **Home Emotional Support Score** | **Home Cognitive Stimulation Score** |
|  | **TID effect in lowest score quartile** | **Additional effect in other quartiles** | **TID effect in lowest score quartile** | **Additional effect in other quartiles** |
|  | *Direct Effect* | *Moderating Effect* | *Direct Effect* | *Moderating Effect* |
| **PIAT** |  |  |  |  |
| Math | 3.12\*(0.05) | -4.77\*(0.00) | 2.15(0.13) | -4.07\*(0.01) |
| Reading | 1.27(0.39) | -3.63\*(0.02) | 1.25(0.37) | -3.57\*(0.03) |
| **Behavior Problem Index** |  |  |  |  |
| Externalizing | -6.48(0.69) | 32.72\*(0.04) | 22.78(0.13) | -1.88(0.90) |
| Internalizing | -8.19(0.59) | 28.88(0.09) | 5.58(0.70) | 8.36(0.58) |
| Total | -8.31(0.61) | 35.38\*(0.03) | 22.20(0.15) | -1.46(0.93) |

Note: Each cell presents a regression coefficient and associated p-value. These are obtained for each dependent variable (row), for each moderating variable (top-most column level), from a linear regression of the dependent variable on TID, interaction of TID with the moderating variable, the moderating variable and all other controls as in the baseline analysis. The direct effect is the coefficient on TID, and the additional effect in other quartiles is the coefficient on the interaction term.

**Table III: Baseline Analysis: Interaction between contemporary HOME subscales on the association between exposure to TID during infancy and outcome variables: Predicted Values.**

|  |  |  |
| --- | --- | --- |
|  | **Home Emotional Support Score** | **Home Cognitive Stimulation Score** |
|  | **Predicted means in lowest score quartile** | **Predicted means in other quartiles** | **Predicted means in lowest score quartile** | **Predicted means in other quartiles** |
|  |  |  |  |  |
| **PIAT** |  |  |  |  |
| Math | 44.75/45.36 | 57.40/51.35 | 41.21/41.68 | 58.89/52.79 |
| Reading | 25.24/23.80 | 43.22/35.08 | 21.37/21.12 | 44.35/36.72 |
| **Behavior Problem Index** |  |  |  |  |
| Externalizing | 592.1/600.3 | 494.9/536.5 | 589.7/626.2 | 491.3/526.5 |
| Internalizing | 569.7/572.5 | 482.5/515.7 | 561.2/577.3 | 480.1/509.0 |
| Total | 604.3/611.0 | 501.5/545.0 | 599.1/635.4 | 498.5/535.7 |

Note: Each cell presents the mean predicted value for two groups: children exposed to TID/children not exposed to TID. Two sets of predicted values are presented for each moderating variable: one for children at homes in the lowest quartile of home environment scores, and the second for children at homes in the other three quartiles of home environment scores. For each dependent variable (row), the predicted values for each moderating variable (top-most column level) are obtained from the regressions in the previous table(a linear regression of the dependent variable on TID, interaction of TID with the moderating variable, the moderating variable and all other controls as in the baseline analysis).

**Table IV: The mean differential effect of exposure to TID in the first 3 years of age on cognitive and behavioral outcomes.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Pre-Birth Income in Lowest Quartile** |  | **Pre-Birth Income in Middle Quartiles** |  | **Pre-Birth Income in Highest Quartile** |  |
| **PIAT** |  |  |  |  |  |  |
| Math | 0.81(0.64) |  | -0.91(0.48) |  | -5.60(0.01) |  |
| Reading | 1.13(0.51) |  | -1.07(0.42) |  | -7.78\*(0.00) |  |
| **Behavior Problem Index** |  |  |  |  |  |  |
| Externalizing | 38.15(0.04) |  | 7.58(0.58) |  | 47.34(0.03) |  |
| Internalizing | 33.79(0.05) |  | 8.58(0.50) |  | 16.78(0.38) |  |
| Total | 41.06(0.03) |  | 9.26(0.51) |  | 43.79(0.05) |  |

(\* indicate significant at or lower than 5% level Benjamini- Hochberg- Yekutieli corrected)

**Table V: Baseline Analysis: Moderating effects of family composition, child’s age and gender on the association between exposure to TID during infancy and outcome variables.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Moderating Effect of Family Composition** | **Moderating Effect of Age** | **Moderating Effect of Female Gender** |
| **PIAT** |  |  |  |
| Math | 3.29(0.09) | -0.33(0.08) | 0.45(0.79) |
| Reading | 4.07(0.05) | 0.22(0.26) | -1.70(0.33) |
| **Behavior Problem Index** |  |  |  |
| Externalizing | -25.26(0.21) | -1.29(0.43) | -33.01(0.06) |
| Internalizing | -22.19(0.23) | -4.62\*(0.01) | -19.48(0.23) |
| Total | -26.53(0.19) | -1.85(0.26) | -29.34(0.10) |

The coefficients and p-values presented above refer to the coefficient on the interaction of TID and age or the interaction of TID and gender or the interaction of TID and a dummy for not being in a two-parent family in the same specification as those in Table 2 of the main text, except that they include these interaction terms; \* indicate significant at or lower than 5% level, Benjamini- Hochberg- Yekutieli corrected

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