**Supplementary Materials**

**KmL3D.** KmL3D is based on k-means algorithm to model longitudinal data. K-means clustering method uses an iterative algorithm in which k points are randomly initialized as cluster centers in the data space. A partition is then defined from these points by attributing each data point to the nearest cluster center according to a predefined distance criterion. The partitions are then updated, and their cluster mean is recalculated, replacing the cluster center. This step is then repeated until convergence of the cluster centers. For the longitudinal kml3d method, the k points are replaced with randomly sampled sequences, and the distance is calculated through the panel of existing distance for longitudinal data. Moreover, several trajectories are considered simultaneously to compute interindividual distances. KmL3D approach uses the multidimensional Euclidean to calculate interindividual distances (Euclidean norm of the distance matrices).

**Figure S1.** K-means analysis using kml3d packages in R.

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*Note:* This figure showcases the results derived from a cluster analysis executed using the 'kml3d' package in R, employing the Calinski-Harabasz method. The left panel indicates the optimal number of clusters, identifiable by peaks in the plot, defining a two-cluster solution. These clusters maximize inter-cluster variance while minimizing intra-cluster variance, providing a pivotal delineation.

On the right panel, trajectories of various adversities over time are depicted. Each black line represents a unique trajectory for an individual child. The bold blue and red lines signify the mean trends across the two clusters. Specifically, the red line illustrates mean trends within the Low Adversity cluster, while the light blue line represents trends within the High Adversity cluster.

The Y-axes denote levels of individual adversities, all variables were scaled before the cluster analysis. The X-axes denote time.

**Figure S2.** Graphical representation of the model for intergenerational transmission of risk with buffering effect of asset variables (protective model of resilience).

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*Note:* Some modeled paths from grandparent mental health, maternal mental health, and adversity exposure are omitted from the figure for the sake of clarity.

**Figure S3.** Graphical representation of the mediation model for intergenerational transmission of risk with mediation effect of asset variables (i.e., vulnerability in the form of reduced assets related to intergenerational risk processes).

*Note:* Some modeled paths from grandparent mental health, maternal mental health, and adversity exposure are omitted from the figure for the sake of clarity.

**Table S1. Items included in the clusters analysis.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Year 3** | **Year 5** | **Year 9** |
| **Physical Neglect** |
|  | Past year, times PCG had to leave child home alone | Past year, times PCG had to leave child home alone | Parent had to leave child home alone even when adult was needed |
|  | Past year, times PCG wasn't able to make sure child got food needed | Past year, times PCG wasn't able to make sure child got food needed | Parent was not able to make sure child got food needed |
|  | Past year, times PCG wasn't able to take child got to a doctor/hospital | Past year, times PCG wasn't able to take child got to a doctor/hospital | Parent was not able to make sure child got to doctor or hospital when needed |
|  | Past year, times you were so drunk/high had problem taking care of child | Past year, times you were so drunk/high had problem taking care of child | Parent was so drunk or high that had problem taking care of child |
| **Physical Abuse** |
|  | Past year, times PCG shook child | Past year, times PCG shook child | Parent shook child |
|  | Past year, times PCG hit child on the bottom with belt or hard object | Past year, times PCG hit child on the bottom with belt or hard object | Parent has hit child on bottom with something like brush or other hard object |
|  | Past year, times PCG spanked child on bottom with bare hand | Past year, times PCG spanked child on bottom with bare hand | Parent has spanked child on bottom with bare hand |
|  | Past year, times PCG slapped child on the hand, arm, or leg | Past year, times PCG slapped child on the hand, arm, or leg | Parent has slapped child on hand, arm or leg |
|  | Past year, times PCG pinched child | Past year, times PCG pinched child | Parent has pinched child |
| **Emotional Abuse** |
|  | Past year, times PCG shouted, yelled, or screamed at child | Past year, times PCG shouted, yelled, or screamed at child | Parent has shouted, yelled or screamed at child |
|  | Past year, times PCG swore or cursed at child | Past year, times PCG swore or cursed at child | Parent has sworn or cursed at child |
|  | Past year, times PCG said would send child away or kick out of house | Past year, times PCG said would send child away or kick out of house | Parent has said would send child away or kick child out of the house |
|  | Past year, times PCG threatened to spank/hit child but did not | Past year, times PCG threatened to spank/hit child but did not | Parent has threatened to spank or hit child but did not actually do it |
|  | Past year, times PCG called child dumb or lazy or similar name | Past year, times PCG called child dumb or lazy or similar name | Parent has called child dumb/lazy/some other name like that |
| **Parental involvement with the criminal justice system** |
|  | Have you been booked or charged with breaking the law? | In last 2 yrs been charged w/ breaking law by police/court? | You have been booked/charged with breaking a law since last interview |
|  | Constructed - mother report, father has spent time in jail by her 3yr interview | Constructed - mother report, father has spent time in jail by mother five-year interview | Constructed - mother report, father has spent time in jail by mother nine-year interview |
| **Mother substance abuse** |
|  | In past year, used sedatives on your own? | During past year, did you use sedatives on your own? | Used sedatives on your own during past 12 months |
|  | In past year, used tranquilizers on your own? | During past year, did you use tranquilizers or 'nerve pills' on your own? | Used tranquilizers on your own during past 12 months |
|  | In past year, used amphetamines on your own? | During past year, did you use amphetamines/stimulants on your own? | Used amphetamines/other stimulants on your own during past 12 months |
|  | In past year, used analgesics on your own? | During past year, did you use analgesics/prescription painkillers on own? | Used analgesics/prescription painkillers on your own during past 12 months |
|  | In past year, used inhalants on your own? | During past year, did you use inhalants you sniff or breathe to get high? | Used inhalants on your own during past 12 months |
|  | In past year, used marijuana on your own? | During past year, did you use marijuana or hashish? | Used marijuana/hashish on your own during past 12 months |
|  | In past year, used cocaine on your own? | During past year, did you use cocaine or crack or free base? | Used cocaine/crack/free base on your own during past 12 months |
|  | In past year, used LSD/hallucinogens on your own? | During past year, did you use LSD or other hallucinogens? | Used LSD/other hallucinogens on your own during past 12 months |
|  | In past year, used heroin on your own? | During past year, did you use Heroin? | Used heroin on your own during past 12 months |

*Note:* PGC = Primary Care Giver

**Table S2. Items included in the maladjustment measure.**

|  |
| --- |
| **Self-reported of depressive symptoms** |
|  | I feel I cannot shake off the blues, even with help |
|  | I feel sad |
|  | I feel happy |
|  | I feel life is not worth living |
|  | I feel depressed |
| **Self-reported of substance abuse** |
|  | Ever drank alcohol more than two times without parents? |
|  | Ever tried marijuana? |
|  | Ever tried other illegal drugs besides marijuana? |
|  | Alcohol easily available to you in your home? |
|  | Parents ever given you alcohol to drink? |
|  | Ever used prescription drugs (not prescribed)? |
| **Frequency of delinquent behaviors** |
|  | Painted graffiti or signs on private property/public spaces |
|  | Deliberately damaged property that didn't belong to you |
|  | Taken something from a store without paying for it |
|  | Gotten into a serious physical fight |
|  | Hurt someone badly enough to need bandages or medical care |
|  | Driven a car without its owner's permission |
|  | Stolen something worth more than $50 |
|  | Gone into a house or building to steal something |
|  | Used or threaten to use a weapon to get something |
|  | Sold marijuana or other drugs |
|  | Stolen something worth less than $50 |
|  | Taken part in a group fight |
|  | Were you loud, rowdy, or unruly in a public place |
| **School Troubles** |
|  | Trouble paying attention in school |
|  | Trouble getting along with your teachers |
|  | Trouble getting your homework done |
|  | Trouble getting along with other students |

**Table S3. Items included in the clusters analysis.**

| **Variable** | **Overall**, N = 1,542*1* | **Adversity Clusters** | *t2* | *p* |
| --- | --- | --- | --- | --- |
| **Low Adversity Cluster**, N = 836*1* | **High Adversity Cluster**, N = 706*1* |
| **Physical Neglect at Age 3** | -0.05(0.87) | -0.11 (0.56) | 0.02 (1.13) | -2.84 | .005\*\* |
| **Physical Neglect at Age 5** | -0.08 (0.75) | -0.09 (0.69) | -0.06 (0.82) | -0.88 | .376 |
| **Physical Neglect at Age 9** | 0.13 (1.29) | 0.10 (1.24) | 0.16 (1.33) | -0.85 | .396 |
| **Emotional Abuse at Age 3** | 0.00 (0.90) | -0.11 (0.88) | 0.13 (0.92) | -5.19 | <.001\*\*\* |
| **Emotional Abuse at Age 5** | 0.13 (0.96) | -0.02 (0.93) | 0.31 (0.96) | -6.70 | <.001\*\* |
| **Emotional Abuse at Age 9** | -0.13 (1.11) | -0.29 (1.07) | 0.05 (1.13) | -6.11 | <.001\*\*\* |
| **Physical Abuse at Age 3** | 0.22 (0.98) | 0.11 (0.94) | 0.36 (1.00) | -5.13 | <.001\*\*\* |
| **Physical Abuse at Age 5** | 0.11 (1.00) | -0.04 (0.95) | 0.28 (1.03) | -6.36 | <.001\*\*\* |
| **Physical Abuse at Age 9** | -0.33 (0.94) | -0.46 (0.85) | -0.18 (1.01) | -5.78 | <.001\*\*\* |
| **Parental Involvement in Criminal Justice System at Age 3** | 0.00 (1.06) | -0.84 (0.30) | 0.98 (0.73) | -62.01 | <.001\*\*\* |
| **Parental Involvement in Criminal Justice System at Age 5** | -0.04 (0.95) | -0.85 (0.24) | 0.91 (0.46) | -92.74 | <.001\*\*\* |
| **Parental Involvement in Criminal Justice System at Age 9** | 0.05 (0.99) | -0.74 (0.49) | 0.98 (0.51) | -67.48 | <.001\*\*\* |
| **Maternal Substance Abuse at Age 3** | 0.01 (1.04) | -0.08 (0.77) | 0.10 (1.28) | -3.27 | .001\*\* |
| **Maternal Substance Abuse at Age 5** | -0.06 (0.89) | -0.12 (0.65) | 0.01 (1.11) | -2.85 | .004\*\* |
| **Maternal Substance Abuse at Age 9** | 0.05 (1.06) | -0.08 (0.71) | 0.21 (1.34) | -5.33 | <.001\*\*\* |

*Note:* 1Mean (SD); 2 Independent t-test; \*\*\* *p* <.001; \*\* *p* < .01; \* *p* < .05.

**Table S4. Mediation model for intergenerational transmission of risk with buffering effect of asset variables (i.e., protective model of resilience).**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **β** | **se** | ***p*** | **95% CI** |
| **Outcome: Maternal Mental Health** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.29 | 0.02 | <.000\*\*\* | [0.241; 0.332] |
| Income | -0.08 | 0.02 | <.000\*\*\* | [-0.111; -0.040] |
| Maternal Education | -0.04 | 0.02 | .061 | [-0.074; 0.002] |
| Maternal age at birth | -0.03 | 0.02 | .212 | [-0.060; 0.013] |
| R2 = 0.09 |  |  |  |  |  |
| **Outcome: Adversity Groups** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.07 | 0.03 | .02\* | [0.013; 0.126] |
| Maternal Mental Health | 0.08 | 0.03 | .008\*\* | [0.020; 0.133] |
| Income | -0.22 | 0.02 | <.000\*\*\* | [-0.266; -0.173] |
| Maternal Education | -0.06 | 0.03 | .021\* | [-0.111; -0.009] |
| Maternal age at birth | -0.20 | 0.02 | <.000\*\*\* | [-0.249; -0.151] |
| R2 = 0.16 |  |  |  |  |  |
| **Outcome: Maladjustment in Adolescence** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.01 | 0.02 | .611 | [-0.033; 0.057] |
| Maternal Mental Health | 0.05 | 0.02 | .017\* | [0.009; 0.096] |
| Adversity Exposure | 0.15 | 0.03 | <.000\*\*\* | [0.104; 0.218] |
| Social Skills at School | -0.14 | 0.04 | <.000\*\*\* | [-0.226; -0.058] |
| Social Expressivity | -0.03 | 0.03 | .437 | [-0.093; 0.040] |
| Connectedness at School | -0.05 | 0.04 | .131 | [-0.124; 0.016] |
| Perseverance | -0.06 | 0.03 | .053 | [-0.031; 0.001] |
| Social Skills at School x Adversity Exposure | 0.01 | 0.05 | .840 | [-0.085; 0.104] |
| Social Expressivity x Adversity Exposure | 0.01 | 0.04 | .867 | [-0.073; 0.086] |
| Connectedness at School x Adversity Exposure | 0.01 | 0.04 | .821 | [-0.067; 0.085] |
| Perseverance x Adversity Exposure | 0.02 | 0.04 | .594 | [-0.055; 0.096] |
| Income | -0.03 | 0.02 | .087 | [-0.072; 0.005] |
| Maternal Education | -0.03 | 0.02 | .139 | [-0.068; 0.009] |
| Maternal age at birth | 0.01 | 0.02 | .451 | [-0.023; 0.052] |
| Child Age | 0.04 | 0.02 | .020\* | [0.006; 0.074] |
| R2 = 0.07 |  |  |  |  |  |
| Indirect Effect |  |  |  |  |  |
| Grandparent Mental Health Problems > Maternal Mental Health > Adversity Groups | 0.003 | 0.001 | .017\* | [0.001; 0.006] |  |

*Note:* *\*\*\* p <.001; \*\* p<.01; \* p<.05.*

**Table S5. Mediation model for intergenerational transmission of risk with mediation effect of asset variables (i.e., vulnerability in the form of reduced assets related to intergenerational risk processes).**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **β** | **se** | ***p*** | **95% CI** |
| **Outcome: Maternal Mental Health** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.29 | 0.02 | <.000\*\*\* | [0.241; 0.332] |
| Income | -0.08 | 0.02 | <.000\*\*\* | [-0.111; -0.040] |
| Maternal Education | -0.04 | 0.02 | .061 | [-0.074; 0.002] |
| Maternal age at birth | -0.03 | 0.02 | .212 | [-0.060; 0.013] |
| R2 = 0.09 |  |  |  |  |  |
| **Outcome: Adversity Groups** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.07 | 0.03 | .02\* | [0.013; 0.126] |
| Maternal Mental Health | 0.08 | 0.03 | .008\*\* | [0.020; 0.133] |
| Income | -0.22 | 0.02 | <.000\*\*\* | [-0.266; -0.173] |
| Maternal Education | -0.06 | 0.03 | .021\* | [-0.111; -0.009] |
| Maternal age at birth | -0.20 | 0.02 | <.000\*\*\* | [-0.249; -0.151] |
| R2 = 0.16 |  |  |  |  |  |
| **Outcome: Social Skills at Schools** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.025 | 0.03 | .374 | [-0.030; 0.079] |  |
| Maternal Mental Health | -0.086 | 0.03 | .001\*\* | [-0.139; -0.033] |  |
| Adversity Exposure | -0.106 | 0.03 | .002\*\* | [-0.173; -0.38] |  |
| Income | 0.132 | 0.02 | <.000\*\*\* | [0.084; 0.179] |  |
| Maternal Education | -0.009 | 0.02 | .712 | [-0.057; 0.039] |  |
| Maternal age at birth | 0.054 | 0.02 | .022\* | [0.008; 0.101] |  |
| R2 = 0.06 |  |  |  |  |  |
| **Outcome: Social Expressivity** |  |  |  |  |  |
| Grandparent Mental Health Problems | -0.003 | 0.023 | .891 | [-0.048; 0.042] |  |
| Maternal Mental Health | -0.030 | 0.023 | .189 | [-0.074; 0.015] |  |
| Adversity Exposure | -0.011 | 0.03 | .689 | [-0.066; 0.043] |  |  |  |
| Income | 0.12 | 0.02 | <.000\*\*\* | [0.08; 0.159] |  |  |  |
| Maternal Education | 0.14 | 0.02 | <.000\*\*\* | [0.105; 0.182] |  |  |  |
| Maternal age at birth | -0.05 | 0.02 | .007\*\* | [-0.092; -0.015] |  |  |  |
| R2 = 0.04 |  |  |  |  |  |  |  |
| **Outcome: Connectedness at School** |  |  |  |  |  |  |  |
| Grandparent Mental Health Problems | -0.06 | 0.02 | .008\*\* | [-0.11; -0.016] |  |  |  |
| Maternal Mental Health | 0.01 | 0.02 | .767 | [-0.039; 0.051] |  |  |  |
| Adversity Exposure | -0.05 | 0.03 | .048\* | [-0.11; 0.00] |  |  |  |
| Income | 0.06 | 0.02 | .009\*\* | [0.014; 0.097] |  |  |  |
| Maternal Education | -0.02 | 0.02 | .327 | [-0.058; 0.019] |  |  |  |
| Maternal age at birth | -0.01 | 0.02 | .568 | [-0.050; 0.028] |  |  |  |
| R2 = 0.01 |  |  |  |  |  |  |  |
| **Outcome: Perseverance** |  |  |  |  |  |  |  |
| Grandparent Mental Health Problems | -0.03 | 0.02 | .180 | [-0.078; 0.015] |  |  |  |
| Maternal Mental Health | 0.01 | 0.02 | .614 | [-0.033; 0.056] |  |  |  |
| Adversity Exposure | 0.01 | 0.03 | .683 | [-0.042; 0.065] |  |  |  |
| Income | 0.01 | 0.02 | .627 | [-0.030; 0.050] |  |  |  |
| Maternal Education | 0.03 | 0.02 | .122 | [-0.008; 0.070] |  |  |  |
| Maternal age at birth | 0.002 | 0.02 | .936 | [-0.037; 0.040] |  |  |  |
| R2 = 0.002 |  |  |  |  |  |  |  |
| **Outcome: Maladjustment in Adolescence** |  |  |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.01 | 0.02 | .609 | [-0.033; 0.056] |
| Maternal Mental Health | 0.04 | 0.02 | .052 | [0.000; 0.085] |
| Adversity Exposure | 0.14 | 0.03 | <.000\*\*\* | [0.088; 0.202] |
| Social Skills at School | -0.13 | 0.04 | <.000\*\*\* | [-0.180; -0.087] |
| Social Expressivity | -0.02 | 0.03 | .327 | [-0.057; 0.019] |
| Connectedness at School | -0.05 | 0.04 | .014\* | [-0.084; -0.009] |
| Perseverance | -0.05 | 0.03 | .007\*\* | [-0.087; -0.014] |
| Income | -0.03 | 0.02 | .178 | [-0.065; 0.012] |
| Maternal Education | -0.03 | 0.02 | .112 | [-0.070; 0.007] |
| Maternal age at birth | 0.02 | 0.02 | .336 | [-0.019; 0.056] |
| Child Age | 0.04 | 0.02 | .019\* | [0.007; 0.075] |
| R2 = 0.07 |  |  |  |  |  |
| Indirect Effect  |  |  |  |  |  |
| Grandparent Mental Health Problems> Maternal Mental Health > Adversity Groups | 0.003 | 0.001 | .017\* | [0.001; 0.006] |  |
| Grandparent Mental Health Problems > Maternal Mental Health > Adversity Groups > Social Skills at School | 0.000 | 0.000 | .056 | [0.000; 0.001] |  |
| Grandparent Mental Health Problems> Maternal Mental Health > Adversity Groups > Social Expressivity | 0.000 | 0.000 | .704 | [-0.00003;0.00003] |  |
| Grandparent Mental Health Problems > Maternal Mental Health > Adversity Groups > Connectedness at School | 0.000 | 0.000 | .172 | -0.000024; 0.000132 |  |
| Grandparent Mental Health Problems > Maternal Mental Health > Adversity Groups > Perseverance | 0.000 | 0.000 | .692 | [-0.00007; 0.00005] |  |

*Note:* *\*\*\* p <.001; \*\* p<.01; \* p<.05.*

**Table S6 Mediation model for intergenerational transmission of risk with full-information maximum likelihood method and bootstrapped approach.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **β** | **se** | ***p*** | **95% CI** |
| **Outcome: Maternal Mental Health** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.286 | 0.031 | <.001\*\*\* | [0.226; 0.347] |
| Income | -0.076 | 0.017 | <.001\*\*\* | [-0.108; -0.043] |
| Maternal Education | -0.036 | 0.019 | .063 | [-0.074; 0.002] |
| Maternal age at birth | -0.023 | 0.019 | .229 | [-0.061; 0.015] |
| R2 = .09 |  |  |  |  |  |
| **Outcome: Adversity Groups** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.070 | 0.029 | .016\* | [0.013; 0.126] |
| Maternal Mental Health | 0.077 | 0.028 | .007\*\* | [0.021; 0.132] |
| Income | -0.219 | 0.036 | <.001\*\*\* | [-0.289; -0.149] |
| Maternal Education | -0.060 | 0.029 | .036\* | [-0.116; -0.004] |
| Maternal age at birth | -0.200 | 0.026 | <.001\*\*\* | [-0.252; -0.148] |
| R2 = .16 |  |  |  |  |  |
| **Outcome: Maladjustment in Adolescence** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.012 | 0.024 | .623 | [-0.035; 0.058] |
| Maternal Mental Health | .053 | 0.024 | .029\* | [0.005; 0.100] |
| Adversity Exposure | .161 | 0.028 | <.001\*\*\* | [0.105; 0.217] |
| Income | -.050 | 0.019 | .011\* | [-0.088; -0.012] |
| Maternal Education | -.033 | 0.020 | .101 | [-0.073; 0.007] |
| Maternal age at birth | .014 | 0.019 | .460 | [-0.023; 0.051] |
| Child Age | .041 | 0.018 | .026\* | [0.005; 0.077] |
| R2 = .04 |  |  |  |  |  |
| **Indirect Effect** |
| Grandparent Mental Health Problems > Maternal Mental Health > Adversity Groups | 0.004 | 0.001 | .017\* | [0.001; 0.006] |

*Note:* N = 4897; *\*\*\* p <.001; \*\* p<.01; \* p<.05.*

**Table S7. Intergenerational transmission of risk model with compensatory asset variables as predictors of maladjustment in adolescence with full-information maximum likelihood method and bootstrap approach.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **β** | **se** | ***p*** | **95% CI** |
| **Outcome: Maternal Mental Health Problems** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.286 | 0.032 | <.001\*\*\* | [0.224; 0.349] |
| Income | -0.076 | 0.016 | <.001\*\*\* | [-0.107; -0.045] |
| Maternal Education | -0.037 | 0.020 | .065 | [-0.077; 0.002] |
| Maternal Age at Birth | -0.026 | 0.019 | .172 | [-0.062; 0.011] |
| R2 = .09 |  |  |  |  |  |
| **Outcome: Adversity Exposure** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.069 | 0.029 | .020\* | [0.011; 0.126] |
| Maternal Mental Health Problems | 0.077 | 0.031 | .012\* | [0.017; 0.138] |
| Income | -0.219 | 0.031 | <.001\*\*\* | [-0.279; -0.159] |
| Maternal Education | -0.061 | 0.029 | .034\* | [-0.118; -0.004] |
| Maternal Age at Birth | -0.201 | .026 | <.001\*\*\* | [-0.251; -0.150] |
| R2 = .16 |  |  |  |  |  |
| **Outcome: Maladjustment in Adolescence** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.010 | 0.023 | .662 | [-0.036; 0.056] |
| Maternal Mental Health | 0.046 | 0.024 | .052 | [-0.0004; 0.092] |
| Adversity Exposure | 0.149 | 0.030 | <.001\*\*\* | [0.091; 0.207] |
| Social Skills at School | -0.142 | 0.024 | <.001\*\*\* | [-0.189; -0.094] |
| Social Expressivity | -0.018 | 0.020 | .372 | [-0.057; 0.021] |
| Connectedness at School | -0.050 | 0.020 | .010\* | [-0.088; -0.012] |
| Perseverance | -0.048 | 0.018 | .009\*\* | [-0.084; -0.012] |
| Income | -0.025 | 0.021 | .231 | [-0.065; 0.016] |
| Maternal Education | -0.031 | .020 | .130 | [-0.070; 0.009] |
| Maternal age at birth | 0.020 | .019 | .296 | [-0.017; 0.057] |
| Child Age | 0.040 | .019 | .031\* | [0.004; 0.077] |
| R2 = .07 |  |  |  |  |  |
| **Indirect Effect** |  |  |  |  |  |
| Grandparent Mental Health Problems > Maternal Mental Health Problems > Adversity Exposure > Maladjustment in Adolescence | 0.003 | 0.001 | .027\* | [0.0004; 0.0006] |  |

*Note:* N = 4897; *\*\*\* p <.001; \*\* p<.01; \* p<.05.*

**Table S8. Mediation model for intergenerational transmission of risk with buffering effect of asset variables with full-information maximum likelihood method and bootstrap approach.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **β** | **se** | ***p*** | **95% CI** |
| **Outcome: Maternal Mental Health** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.286 | 0.031 | <.001\*\*\* | [.0226; 0.346] |
| Income | -0.076 | 0.016 | <.001\*\*\* | [-0.108; -0.044] |
| Maternal Education | -0.037 | 0.020 | .061 | [-0.076; 0.002] |
| Maternal Age at Birth | -0.026 | 0.019 | .182 | [-0.063; 0.012] |
| R2 = .09 |  |  |  |  |  |
| **Outcome: Adversity Groups** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.069 | 0.029 | .015\* | [0.013; 0.126] |
| Maternal Mental Health Problems | 0.078 | 0.029 | .006\*\* | [0.022; 0.134] |
| Income | -0.219 | 0.029 | <.001\*\*\* | [-0.277; -0.161] |
| Maternal Education | -0.062 | 0.028 | .026\* | [-0.116; -0.007] |
| Maternal Age at Birth | -0.200 | 0.026 | <.001\*\*\* | [-0.252; -0.148] |
| R2 = .16 |  |  |  |  |  |
| **Outcome: Maladjustment in Adolescence** |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.010 | 0.023 | .667 | [-0.035; 0.054] |
| Maternal Mental Health | 0.047 | 0.024 | .049\* | [0.0002; 0.094] |
| Adversity Exposure | 0.151 | 0.030 | <.001\*\*\* | [0.093; 0.209] |
| Social Skills at School | -0.156 | 0.121 | .196 | [-0.393; 0.081] |
| Social Expressivity | -0.047 | 0.095 | .622 | [-0.234; 0.140] |
| Connectedness at School | -0.081 | 0.090 | .369 | [-0.258; 0.096] |
| Perseverance | -0.099 | 0.088 | .258 | [-0.272; 0.073] |
| Social Skills at School x Adversity Exposure | 0.027 | 0.124 | .829 | [-0.216; 0.269] |
| Social Expressivity x Adversity Exposure | 0.021 | 0.099 | .830 | [-0.172; 0.214] |
| Connectedness at School x Adversity Exposure | 0.028 | 0.095 | .767 | [-0.158; 0.215] |
| Perseverance x Adversity Exposure | 0.048 | 0.091 | .596 | [-0.130; 0.226] |
| Income | -0.030 | 0.021 | .142 | [-0.071; 0.010] |
| Maternal Education | -0.028 | 0.021 | .171 | [-0.069; 0.010] |
| Maternal age at birth | 0.015 | 0.020 | .468 | [-0.025; 0.054] |
| Child Age | 0.041 | 0.018 | .026\* | [0.005; 0.076] |
| R2 = .06 |  |  |  |  |  |
| **Indirect Effect** |  |  |  |  |  |
| Grandparent Mental Health Problems > Maternal Mental Health > Adversity Groups | 0.003 | 0.001 | .018\* | [0.001; 0.006]  |  |

*Note:* N = 4897; *\*\*\* p <.001; \*\* p<.01; \* p<.05.*

**Table S9. Mediation model for intergenerational transmission of risk with mediation effect of asset variables with full-information maximum likelihood method and bootstrap approach.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **β** | **se** | ***p*** | **95% CI** |
| **Outcome: Maternal Mental Health** |  |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.286 | 0.031 | <.001\*\*\* | [.0225; 0.347] |
| Income | -0.076 | 0.016 | <.001\*\*\* | [-0.108; -0.044] |
| Maternal Education | -0.037 | 0.021 | .079 | [-0.079; 0.004] |
| Maternal age at birth | -0.026 | 0.019 | .176 | [-0.063; 0.012] |
| R2 = .09 |  |  |  |  |  |  |
| **Outcome: Adversity Groups** |  |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.069 | 0.029 | .019\* | [0.011; 0.127] |
| Maternal Mental Health | 0.074 | 0.029 | .010\* | [0.018; 0.131] |
| Income | -0.222 | 0.030 | <.001\*\*\* | [-0.282; -0.163] |
| Maternal Education | -0.060 | 0.028 | .031\* | [-0.114; -0.006] |
| Maternal age at birth | -0.201 | 0.028 | <.001\*\*\* | [-0.255; -0.147] |
| R2 = .16 |  |  |  |  |  |  |
| **Outcome: Social Skills at Schools** |  |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.025 | 0.030 | .413 | [-0.034: 0.084] |
| Maternal Mental Health | -0.086 | 0.027 | .002\*\* | [-0.140; -0.032] |
| Adversity Exposure | -0.106 | 0.035 | .002\*\* | [-0.173; -0.038] |
| Income | 0.132 | 0.027 | <.001\*\*\* | [0.079; 0.185] |
| Maternal Education | -0.009 | 0.024 | .708 | [-0.056; 0.038] |
| Maternal age at birth | 0.054 | 0.023 | .017 | [0.010; .099] |
| R2 = .06 |  |  |  |  |  |  |
| **Outcome: Social Expressivity** |  |  |  |  |  |  |
| Grandparent Mental Health Problems | -0.003 | 0.022 | .887 | [-0.046; 0.040] |
| Maternal Mental Health | -0.030 | 0.024 | .215 | [-0.076; 0.017] |
| Adversity Exposure | -0.011 | 0.029 | .700 | [-0.068; 0.046] |  |  |
| Income | 0.120 | 0.021 | <.001\*\*\* | [0.079; 0.161 |  |  |
| Maternal Education | 0.143 | 0.020 | <.001\*\*\* | [0.103; 0.183] |  |  |
| Maternal age at birth | -0.053 | 0.020 | .009\*\* | [-0.093; -0.013] |  |  |
| R2 = .04 |  |  |  |  |  |  |
| **Outcome: Connectedness at School** |  |  |  |  |  |  |
| Grandparent Mental Health Problems | -0.063 | 0.026 | .017\* | [-0.115; -0.011] |  |  |
| Maternal Mental Health | 0.007 | 0.026 | .792 | [-0.043; 0.057] |  |  |
| Adversity Exposure | -0.055 | 0.028 | .049\* | [-0.110; -0.0003] |  |  |
| Income | 0.056 | 0.019 | .004\*\* | [0.018; 0.093] |  |  |
| Maternal Education | -0.019 | 0.020 | .324 | [-0.058; 0.019] |  |  |
| Maternal age at birth | -0.011 | 0.019 | .560 | [-0.049; 0.027] |  |  |
| R2 = .01 |  |  |  |  |  |  |  |  |
| **Outcome: Perseverance** |  |  |  |  |  |  |  |  |
| Grandparent Mental Health Problems | -0.032 | 0.026 | .225 | [-0.083; 0.019] |  |  |
| Maternal Mental Health | 0.011 | 0.025 | .652 | [-0.038; 0.070] |  |  |
| Adversity Exposure | 0.011 | 0.030 | .710 | [-0.048; 0.061] |  |  |
| Income | 0.010 | 0.019 | .601 | [-0.027; 0.047] |  |  |
| Maternal Education | 0.031 | 0.020 | .132 | [-0.009; 0.071] |  |  |
| Maternal age at birth | 0.002 | 0.019 | .934 | [-0.036; 0.040] |  |  |
| R2 = .00 |  |  |  |  |  |  |  |  |
| **Outcome: Maladjustment in Adolescence** |  |  |  |  |  |  |  |  |
| Grandparent Mental Health Problems | 0.012 | 0.023 | .606 | [-0.033; 0.056] |
| Maternal Mental Health | 0.043 | 0.023 | .068 | [-0.003; 0.088] |
| Adversity Exposure | 0.145 | 0.030 | <.001\*\*\* | [0.087; 0.203] |
| Social Skills at School | -0.134 | 0.025 | <.001\*\*\* | [-0.182; -0.085] |
| Social Expressivity | -0.019 | 0.020 | .341 | [-0.058; 0.020] |
| Connectedness at School | -0.047 | 0.020 | .020\* | [-0.086; -0.007] |
| Perseverance | -0.051 | 0.019 | .008\*\* | [-0.088; -0.014] |
| Income | -0.027 | 0.021 | .204 | [-0.068; 0.014] |
| Maternal Education | -0.031 | 0.020 | .119 | [-0.071; 0.008] |
| Maternal age at birth | 0.018 | 0.019 | .326 | [-0.018; 0.055] |
| Child Age | 0.041 | 0.018 | .022\* | [0.006; 0.076] |
| R2 = .07 |  |  |  |  |  |  |
| **Indirect Effect**  |  |  |  |  |  |  |
| Grandparent Mental Health Problems > Maternal Mental Health > Adversity Groups | 0.003 | 0.001 | .022\* | [0.004, 0.006] |

*Note:* N = 4987; *\*\*\* p <.001; \*\* p<.01; \* p<.05.*