



Invited Commentary | Pediatrics

Neighborhood Poverty and Brain Development Adaptation or Maturation, Fixed or Reversible?

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In this cross-sectional study, Taylor et al¹ ask whether neighborhood poverty, over and above household income, accounts for variance in brain and cognitive development in a large sample of 11 875 children aged 9 to 10 years. This cross-sectional data set is taken from the ongoing longitudinal Adolescent, Brain, and Cognitive Development (ABCD) study, which follows thousands of children from childhood through adolescence. Taylor and colleagues¹ report that neighborhood poverty accounts for differences in prefrontal and hippocampal volumes as well as several cognitive tasks.

This work advances the field in several ways. First, the power of the collaborative ABCD project is on display, with ample sample size and rich measures. Second, the mechanistic insight offered by the structural equation modeling, namely the analysis associating neighborhood poverty, reading, and oral vocabulary scores with hippocampal and prefrontal cortical volumes, lays the foundation for future work. This finding raises the possibility, open to empirical scrutiny, that school quality may directly shape brain and cognitive development.

Finally, and perhaps most importantly, there is value in shifting the scientific focus from the shaping power of household income to that of neighborhood poverty. This is a key contribution to understanding the embedded ecological contexts that children grow and thrive in.

Indeed, the findings by Taylor and colleagues¹ may be reciprocally informative to convergent data from economists at the Opportunity Insights Project based at Harvard University. The broad goal of this project is to use large-scale data to determine how best to alleviate barriers to economic opportunity in the US. In a relevant 2018 study from this group, Chetty and Hendren² examined tax data from 1996 to 2012 from millions of families who moved across counties in the United States, asking specifically whether income in adulthood is associated with the counties where children grew up. They define a high opportunity area as an area that supports intergenerational mobility (ie, an offspring's adult income that is higher than their parents' income was). Chetty and Hendren² estimated that each year living in a county with 1-SD higher opportunity than the county a person at the 25th percentile of the income distribution was born into was associated with a 10% higher adult income. In a different 2016 study, Chetty and Hendren³ found that moving to a higher opportunity county in childhood was associated with higher adult income in proportion to the amount of time the child spent in the county. The results of the study by Taylor et al¹ results complement those of these studies by Chetty and Hendren^{2,3} with supportive data from cognitive and brain development in children. The 2016 findings from Chetty and Hendren,³ that is, that moving to a higher opportunity area in childhood is associated with changes in adult income outcomes, raises the empirically testable possibility that the outcomes reported by Taylor et al¹ are reversible and, in being so, may not reflect brain and cognitive maturation but rather environmental adaptation.

One theoretical frame on child development is that it is a dynamic movement of a plastic resilient organism as it ontogenetically adapts to changes in the body and challenges in the environment.^{4,5} In keeping with this framework, there are 2 possible interpretations of the findings reported by Taylor et al.¹ One is that neighborhood poverty is associated with unfavorable brain and cognitive outcomes when compared with neighborhood affluence. The alternative is that children in each neighborhood are developing in a way that supports their own survival needs, that is, they have similarly good or favorable developmental courses for survival in their own environments.

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On the latter view, it is not clear how best to interpret a direct comparison of brain and cognitive development across children with different household or neighborhood poverty experiences, precisely because the demands on their developing systems are extremely different. Given ample time in a better neighborhood, children may adapt and thrive, and this may be reflected in their brain and cognitive developmental data, as it was in intergenerational mobility outcomes. To their credit, Taylor et al¹ do not indulge either interpretation, likely recognizing the need for future empirical work on this critical issue. In the meantime, another fruitful avenue with a sample of data as large as the ABCD study might be to look for clues within neighborhood and community at the variables that are associated with risk or resilience outcomes. Taking from findings from economists, there are differences in socioeconomic outcomes within neighborhoods and based on race, ethnicity, and sex. An interdisciplinary approach linking economists and developmental scientists may be an excellent opportunity to shape policy at a granular level.

ARTICLE INFORMATION

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REFERENCES

1. Taylor RL, Cooper SR, Jackson JJ, Barch DM. Assessment of neighborhood poverty, cognitive function, and prefrontal and hippocampal volumes in children. *JAMA Netw Open*. 2020;3(11):e2023774. doi:[10.1001/jamanetworkopen.2020.23774](https://doi.org/10.1001/jamanetworkopen.2020.23774)
2. Chetty R, Hendren N. The effects of neighborhoods on intergenerational mobility II: county level estimates. *Q J Econ*. 2018;133(3):1163-1228. doi:[10.1093/qje/qjy006](https://doi.org/10.1093/qje/qjy006)
3. Chetty R, Hendren N, Katz LF. The effects of exposure to better neighborhoods on children: new evidence from the Moving to Opportunity experiment. *Am Econ Rev*. 2016;106(4):855-902. doi:[10.1257/aer.20150572](https://doi.org/10.1257/aer.20150572)
4. Johnson MH, Jones EJ, Gliga T. Brain adaptation and alternative developmental trajectories. *Dev Psychopathol*. 2015;27(2):425-442. doi:[10.1017/S0954579415000073](https://doi.org/10.1017/S0954579415000073)
5. Werchan DM, Amso D. A novel ecological account of prefrontal cortex functional development. *Psychol Rev*. 2017;124(6):720-739. doi:[10.1037/rev0000078](https://doi.org/10.1037/rev0000078)