The Awesome Brain and the Harm That Poverty Can Cause

A review of

Poverty and Brain Development During Childhood: An Approach From Cognitive Psychology and Neuroscience
by Sebastian J. Lipina and Jorge A. Colombo

Reviewed by
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Written as a “wake-up call addressed to scientists and policymakers” (p. xi), Poverty and Brain Development During Childhood: An Approach From Cognitive Psychology and Neuroscience provides detailed research evidence on how the brain develops and how poverty can have devastating effects on brain development. The authors cite the horrific statistic that more than 1 billion of the world’s children are affected by severe deprivation (p. 3). They specify that deprivation means

lack of or limited access to drinkable water and sanitary facilities; no immunization against diseases; no medical treatment in cases of diarrhea; overcrowding, lack of education between the ages of 7 and 18 years; and no access to radio, television, telephone, or newspapers at home. (pp. 3–4)
This volume is refreshing in that it provides specific areas of deficits associated with poverty rather than global statements referring only to poor children’s lower IQ scores. “Young children from low socioeconomic (SES) families perform worse on tasks requiring working memory, inhibitory control, attention, flexibility, and planning” (p. 7). Educators worry about these particular deficits because they not only negatively affect children’s learning trajectories but may also presage difficulties in the workforce or in handling interpersonal problems in the future.

Defining Poverty

The authors wrestle with a variety of operational definitions of poverty. Some definitions focus mostly on family income, parental education levels, and whether a parent has a job. Some definitions include societal responsibilities, such as whether a family in poverty has access to programs to prevent premature births and early childhood deaths. Other definitions include family variables that research has shown to be inimical to child development, such as low linguistic/cognitive stimulation in families and punitive parenting styles.

The authors insist that any definition must not only delineate income necessary to satisfy daily protein and energy requirements, but rather has to be multifaceted and take into account “income-to-need ratio” (p. 21) as well as psychological, physical, and cultural needs of children. They note that some measures of poverty do include proportion of single-mother households, school poverty rates as measured by percentage of pupils eligible to receive free lunches, and poor housing and neighborhood conditions.

The authors also remind readers of increased risks in poverty families of prenatal drug exposure. Prenatal cocaine exposure “has been associated with deficits in executive functioning such as visual-motor-set-shifting and inhibitory control in childhood” (p. 77). These deficits are especially troubling because self-control measures have been significantly correlated with children’s arithmetic knowledge and phonological skills.

Data are presented in detail on specific poverty variables within families, such as parental punitiveness, lack of learning materials in the home, lack of parental stimulation, and paucity of pleasant conversational levels. These have been remarkably demonstrated by Hart and Risley (1995) in their longitudinal research revealing markedly lower levels of enriching maternal speech with very young children in poverty households.

Neuorological Sequelae of Poverty

The authors’ main concerns in this volume are in specifying the neurological effects of social and physical deprivations associated with poverty that affect early brain development.
Decades of brain research support the authors’ emphasis on the importance of sensitive periods, during which specific, appropriate stimuli are needed “for the brain to progress through developmental stages properly” (p. 37). Detailed technical information is provided on specific cerebral cortical areas associated with prenatal and postnatal development and affected by poverty. For example, the authors specify that “the neural network involved in the observed interactions between PA [phonological awareness] and reading skills lies in the left fusiform gyrus” (p. 88).

Of particular interest is the authors’ presentation of research on stress in intersection with poverty status. Data confirm that higher salivary cortisol reactivity (a measure of higher stress) is particularly significant for male adolescents and for lower SES females. Research in recent years has confirmed that boys in early child care are more vulnerable than girls to effects of stress, whether the children live in poverty or nonpoverty families (Bornstein, Hahn, Gist, & Haynes, 2006; Honig & Park, 1993).

### What Should Be Done?

Professionals seeking funding to enhance cognitive and linguistic skills of children living in poverty will find quite useful the chapter describing successful outcomes of early intervention programs, such as Head Start, the Abecedarian program, or the Perry Preschool program. These citations give evidence of early neural plasticity dependent on enriching experiences—a viewpoint recently strongly emphasized by Norman Doidge (2007).

The descriptions of successful projects provide encouraging ammunition for political efforts to increase national support for quality early childhood programs for children living in poverty. Some of the pioneer early enrichment programs, such as the Family Development Research Program in Syracuse, New York (Lally, Mangione, Honig, & Wittmer, 1988), an omnibus program providing nutritional guidance and infant and preschool education, as well as family education components, were omitted from this chapter and should have been included.

Of particular contemporary interest is the authors’ description of Fast ForWord, a computerized intervention program with adaptive exercises to improve language and auditory processing. They cite research evidence that after eight weeks of training, this program influences neural mechanisms and successfully enhances children’s selective attention and early reading skills.
Target Audience for This Volume

Which readers will profit most from this text? The lengthy, in-depth analyses in *Poverty and Brain Development During Childhood* of how poverty is to be measured would be of more interest to legislative staff who are technically proficient as well as to policy makers, rather than to community planners who intend to implement ameliorative programs.

Graduate students who will be providing services to families living in poverty and who need a refresher course on the landmark neurological research efforts that have confirmed for more than a half century the critical importance of timing and dosage of enrichments for optimal development of ocular or cortical systems, for example, will find this classic research well documented in this volume.

However, the reader of this volume will need to be fairly comfortable with many technical terms, such as “neurotrophins in the synaptic plasticity of the hippocampus” (p. 45), parietal gray matter, acetylcholinesterase enzymes, and dendritic morphology. Some statements, such as “enrichment increases neurogenesis in the dentate gyrus of adult mice” (p. 45), may discourage a student who has had little exposure to the technical terms of neurological development.

Thus, despite the impressive and rich set of references to the most widely respected and landmark research projects in the importance of external stimuli early in development to assist brain development, *Poverty and Brain Development During Childhood* really also needs a glossary of technical terms for the reader coming fresh to the field of neurobiology and its importance in tackling problems of family and community poverty. Also, some of the figures supplied in the text, especially the schematic brain representations (supplied to enhance a reader’s ability to note the locus of areas where neuronal growth and subsequent pruning are being discussed) may not be easily understood unless the reader is technically savvy about decoding such figures.

For those willing to invest careful reading time, the authors, by their fine citations of up-to-date as well as historically classic research, make a compelling case that complex, enriching early experiences enhance neurological dendritic branching and numbers of synapses and therefore will indeed enhance child cognitive and language functions and decrease potential school problems. Every community advocate will endorse the authors’ strong suggestion of the necessity for an exchange of “epistemological, ethical, and methodological” issues (p. 132) among educators and policy makers in order to boost awareness of the urgency of national determination to provide financial supports for optimizing the learning experiences of children living in poverty households.
References


