

BOOK REVIEW

Poverty is Not a Disability

Holly S. Kihm

Southeastern Louisiana University

Authors Lipina and Colombo describe the effects of poverty on children's brain development. Through their research, they developed interventions to help alleviate the detrimental effects of poverty. While their book emphasizes neuroscience, it also discusses relevant classroom and home-based interventions that have been effective in increasing children's early learning. It is the intent of the authors to replicate successful interventions and influence policy in early childhood education.

Keywords: early childhood; poverty; neuroscience

Globally, there is an estimated 1 billion children living in severe poverty (Gordon, Nandy, Pantazis, Pemberton, & Townsend, 2003). Researchers continue to explore the causes and impacts of childhood poverty, as well as develop strategies and policies to address the issues. In their book, *Poverty and brain development during childhood: An approach from cognitive psychology and neuroscience*, authors Sebastian Lipina and Jorge Colombo write a concise overview of the breadth and depth of childhood poverty, and then focus their discussion on how the brain physically changes in response to stressors that are highly correlated with living in poverty in early childhood. The authors begin their discussion of the physical changes in brains by referencing a variety rodent and animal studies. Their discussion then transitions to the changes in brain structure seen in children who have experienced prolonged living in poverty. The authors discuss the ramifications of those changes on children's physical, cognitive, and psychosocial development, and conclude their work by discussing intervention programs and current policy regarding childhood poverty.

BACKGROUND

One of the first tasks the authors needed to accomplish was not only to define poverty, but to identify a clear, yet robust concept of what poverty looks like. They began by discussing how poverty was defined before the 1980's, how that definition changed throughout the 1990's, and how poverty is currently defined. During the 1980's, when research into the effects of poverty on children began to emerge, poverty was defined quite simply. Researchers used very few

variables to define a state of poverty, and the variables were usually based on socioeconomic status indices, and parental education and occupational backgrounds (McLoyd, 1998). In the late 1990's, key researchers widened their definition of poverty to include the meeting, or lack thereof, of specific needs that they felt were crucial for optimal development during childhood. These needs included psychological, physical, and cultural needs (Boltvinik, 1999). Building on the "needs" concept, researchers in the 2000's posited that the concept of poverty "is a result of a comparison between a personal or a family circumstance and a set of universal (absolute) and specific (relative) needs and satisfiers." (Townsend, 1979, LeVine & New, 2008; White, Leavy, & Masters, 2002). The authors identified more specific examples of needs, which included: nourishment, access to health care, housing, socialization and basic education, access to information, affection, identity, and freedom.

Because the concept is so large, and includes a multitude of domains, it remains a challenge to clearly define poverty. Since these domains differ by areas, it would have been helpful if the authors included a table or some other visual aide to identify needs and satisfiers that are specific to different regions. For example, needs and satisfiers in the United States are vastly different than those in developing countries. While children living in poverty in the United States have needs such as nourishment, healthcare and education, they also have access to satisfiers such as WIC, Medicaid, and Head Start education. Children living in poverty in developing countries have those same needs, but their level of satisfiers is very different. Their nourishment may be "satisfied" by basic sustenance (bread, water, local produce), health care may be from volunteer physicians and dentists, and education may only include basic reading and writing. It would have been interesting to see a comparison of needs and satisfiers as a precursor to reading about the effects of poverty on brain development.

Before moving their discussion to the effects of poverty on brain development, however, the authors did choose a definition of poverty developed by Gordon et al., (2003), to use throughout the remainder of their book. This definition is based on the concept of "privations." Privations refers to "a state of observable disadvantage in personal, physical, and mental conditions, as well as local and environmental facilities, social activities, and habits." What is unique about this definition is that it does not include a monetary income component, and the authors refer to levels of privation, such as severe and moderate. Examples of severe privations are a consistent lack of adequate housing, food, and water. Examples of moderate privations are housing that lack utilities, and food sources that may only provide the minimum number of calories and nutrients to sustain life.

EFFECTS OF PHYSICAL AND SOCIAL PRIVATION ON BRAIN DEVELOPMENT

The authors focus on several components of brain development and how those components are affected by privations. The most important components, however, are brain plasticity, critical or sensitive periods, and myelination. The first component, plasticity, refers to how different areas of the brain are able to organize, adapt, or change to meet demands (Lledo, Alonso, & Grubb, 2006). For example, if an area of the brain is damaged due to injury, brain cells surrounding the damaged area change the way they behave in order to compensate for the loss of function caused by the injury. The second component is based on the brain's critical, or sensitive, periods of development. As first noted by Konrad Lorenz, critical periods for brain development occur

when the brain is primed for the optimal acquisition of new skills, most in early childhood. If the brain does not receive the necessary stimulation during these critical periods, then the unused brain areas will eventually adapt to perform different skills and those areas will no longer be available to perform other skills (Lorenz, 1965). Sensitive periods are similar to critical periods; however, the “window of opportunity” for acquiring a skill is fortunately not as rigid (Michel & Tayler, 2005). The third component, myelination, refers to a process in which nerve cells become coated with myelin. Because of this process, the nerve cells are able to transmit information faster which results in more complex brain processes (Nelson, 2002).

In their discussion of brain plasticity, the authors note that even though there have been great strides in imaging techniques for looking into the human brain, animal models remain invaluable resources of information. The authors gave several examples of how material and social privations affect brain development at all levels, including at the molecular, cellular, and systemic functions levels. One such example was in looking at the relationship between the size of the hippocampus and the spatial ability of birds. The researchers found that the hippocampus of birds who stored food (i.e. securing materials for survival) was significantly larger than the hippocampus of birds who did not store food. The result of a larger hippocampus meant that the birds had great spatial abilities, which helped to ensure their survival (Sherry, Jacobs, & Gaulin, 1992). When looking at the human brain, the authors gave a fascinating example of how the environment impacts the development of the hippocampus. Maguire et al. (2000) found that taxi cab drivers with extensive experience in navigating through traffic had larger hippocampuses than drivers who did not have extensive driving experience, further, the volume of the hippocampus was directly related to the amount of time spent driving in challenging conditions. The studies (along with the other studies cited in the book) make a strong argument for just how much the environment impacts brain development. Educators may use these findings when developing curricula, knowing that what they teach, how they teach it, and even where they teach it has a strong influence child’s brain development.

EFFECTS OF PRIVATION ON PHYSICAL, COGNITIVE AND PSYCHOSOCIAL DEVELOPMENT

In order to study the effects of privation on the physical, cognitive, and psychosocial development of children, researchers oftentimes gather data from children who have experienced neglect or abuse. Though the authors discussed numerous examples of how varying levels of privation affected the development of children, their discussions of the development of children who lived in Romanian orphanages were most poignant. In sum, during the early 1990’s Romanian dictator, Nicolae Ceausescu, enacted policies that led to over 150,000 children being placed in state-run orphanages. During their time at the orphanages, the children adhered to strict schedules, with little or no talking or playing. The children were subjected to physical, emotional, and sexual abuse, and they suffered from malnutrition and lack of medical care (Gloviczki, 2004; Holden, 1996).

Using multiple types of assessments, researchers concluded that the privations led to several negative outcomes. One of the most devastating outcomes was that children who spent more than 30 months in the orphanage had less white matter in their brains than children who were moved to foster homes (Sheridan, Fox, Zeanah, McLaughlin & Nelson, 2012). The white matter of the brain is responsible for making connections across different parts of the brain. If

there is not a sufficient amount of white matter present, then those parts of thought that require connectivity do not process as quickly. This loss of connectivity may be related to outcomes such as significant deficits in cognition, low IQ scores, poor to no verbal skills, and hyperactivity.

While the effects of living in the Romanian orphanages were certainly dismal, researchers have noted some very important, positive, changes in children who were adopted out of the orphanages at early ages. For example, they found that many children who received proper medical care, nutrition, education, and sensory stimulation caught up to their peers in growth and mental abilities. Children who were adopted before 6 months of age also showed little problems with caregiver attachment. These findings also have strong implications for early childhood education because they lend support to the importance of quality education for even very young children.

INTERVENTION PROGRAMS AND EDUCATIONAL NEUROSCIENCE

While referencing many other studies that show physical changes in the brain related to living in poverty, the authors did a nice job of summarizing both intervention programs and advances in educational neuroscience that have helped to offset some developmental deficits that some children living in poverty may display. Some of the intervention programs the authors discussed were focused on auditory and language processing, attention training, visuospatial skills, phonologically mediated reading programs, working memory training, behavioral remediation, and selective auditory attention.

The authors elaborated on two interesting intervention programs. The first program was developed by the authors and took place in Buenos Aires, Argentina. The aim of the program was to increase the cognitive abilities of children, ages 3-5, who live in poverty. Their multifocal program ran twice a week for 16 weeks and included cognitive exercises, nutritional supplements, teacher training, and health and social counseling for the children's parents. Rigorous pre and post testing showed that children benefitted the most from a combination of cognitive exercises and nutritional supplements (namely iron and folic acid). The supplements may have contributed to physical changes in the brain (white matter) that allowed for greater changes in cognitive abilities.

The second program, developed by Nash and colleagues, aimed to increase language skills, preliteracy skills, visuospatial skills, numeracy, and overall IQ of children attending Head Start. The researchers posited that children exposed to music training (which included listening, moving, singing, and playing music) would perform higher on tests of cognition. Results showed that children who participated in music training had higher scores on tests assessing receptive and expressive language, object assembly, fluid and quantitative reasoning, and critical thinking than children who did not participate in music training. The authors believe that music training stimulates the part of the brain that is responsible for those areas of cognition. When that area of the brain is stimulated, it is more receptive to learning. For early childhood educators, adding music to the children's day may be beneficial. However, more studies are needed to determine more details on the effects of music training such as: how much music is needed to see a change, if the type of music training can be generalized cross culturally, and when should music training be initiated.

CONCLUSION

The number of children living in poverty is staggering. In this work, the authors discussed many effects of living in poverty, and how a child's brain can be affected by living in poverty. By understanding the structural changes that a child's brain can undergo due to deprivation, the authors argue that interventions should be implemented well before a child reaches the age of three. This is very important because current education policy focuses mainly on preschool children. Early intervention services are available for children identified "at risk" for learning difficulties, but does not reach the broader early childhood population as suggested by the authors.

Though this book was quite challenging to review given its heavy emphasis on neuroscience and the academic vocabulary that accompanies this field, it was fascinating to learn about how the brain physically changes when exposed to privations. Early childhood educators may be interested in learning about just how sensitive the brain is during the period that they are responsible for care, and how receptive it can be to developmentally appropriate teaching methods when applied. The authors identified many intervention programs that have shown positive results, and early childhood educators may benefit from reviewing the programs and determining if a specific program may be appropriate for their setting. Academicians, policy developers, early childhood professionals, and even researchers would benefit from reading this book, as the authors noted that more work is needed in this area in order to protect children from the devastating effects of poverty, and to better help those children who continue to live in poverty.

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