

Summary: “Economic, Neurological, and Behavioral Perspectives on Building America’s Future Workforce”

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Extensive research has identified the negative effects of early exposure to economically disadvantaged environments upon child development (Cicchetti & Toth, 1995; Knudsen, Heckman, Cameron, Shonkoff, 2006). Specifically, poverty, limited parental education, mental health problems, neglect and violence have been found to significantly impact the neural circuitry, cognitive, linguistic, social and emotional abilities of a child’s brain during a time when it is in the early and perhaps most vulnerable stages of development (Knudsen, 2004).

Early interventions such as high quality preschool programs have attempted to thwart the negative effects of such circumstances and improve the young child’s ability to function effectively within society (Knudsen, Heckman, Cameron & Shonkoff, 2006). Between 1962-1967, the Perry Program randomized 64 underserved, severely disadvantaged children into either a treatment or no treatment control condition. In the treatment condition, the children received daily classroom education and weekly teacher home visits for 30 weeks (Knudsen, Heckman, Cameron & Shonkoff, 2006). The Abecedarian Program (1972-1977) soon followed and placed 111 children (mean age at entry = 4.4) in a full day intervention program until the children were age 8. The Perry Program treatment involved daily 2.5-hour classroom session on weekday mornings and a weekly 90-minute home visit by the teacher on weekday afternoons to engage parents in the educational process. The length of each preschool year was 30 weeks, beginning in mid-October and ending in May. The Abecedarian Program was more intensive than the Perry Program. The Abecedarian Program involved year-round, full-day intervention. The initial infant:teacher ratio was 3:1 but it increased to a child:teacher ratio of 6:1 as the children progressed through the program. During the first three primary school years, an additional home-school teacher met with the parents and helped them in providing supplemental educational activities at home. The teacher provided an individually tailored curriculum for each child. The target set for the parents was at least 15 minutes per day of supplementary activities. This home-school teacher also served as a liaison between the ordinary teachers and the family, and she interacted with the parents and the teachers every 2 weeks. She also helped the parents deal with other issues to improve their ability to care for the child, such as finding employment, navigating the bureaucracy of social services agencies, and transporting children to appointments. Participants in the Perry program were followed until age 40, while those in the Abecedarian program, until age 21, although the program continues today. The effects of both intervention programs yielded consistently positive outcomes for participants in the treatment condition when compared to their respective control groups. Academically, individuals in both intervention programs scored higher on measures of academic achievement during the final testing point (Perry, 40yrs; Abecedarian, 21yrs) and achieved higher levels of education with a need for less special education services when both intervention groups were compared to respective controls (Knudsen, Heckman, Cameron & Shonkoff, 2006).

Financially, intervention groups were also more likely to earn higher incomes, own a home and less likely to be involved with the criminal justice system or utilize welfare services. Economically, programs such as these yield impressive financial returns. In the case of the Perry program, the return cost per dollar spent was over 17% (Cunha, Heckman, Lochner & Masterov, 2005).

Interventions such as the Perry and Abecedarian programs have the potential to target the core neural circuitry necessary to positively impact the child's short-term as well as long-term social and cognitive outcomes. The skills beget skills hypothesis or the idea that future skills are dependent upon previously learned skills attempts to explain one mechanism by which early intervention affects such change. For example, the neural circuitry and architecture of the developing brain is critically shaped by early exposure to language, and visual experiences that may be nearly impossible to reverse during later stages (Knudsen, Heckman, Cameron & Shonkoff, 2006). Early intervention experiences are likely to come during a time in which the child's brain is undergoing a sensitive period in development whereby the brain is in a stage of rapid development and susceptible to a variety of positive as well as negative influences (Knudsen, Heckman, Cameron, Shonkoff, 2006). Therefore higher-level abilities are likely dependent upon the formation of early circuitry (Knudsen, Heckman, Cameron & Shonkoff, 2006). As the child ages, such abilities will continue to develop based on the foundation of skills and structures developed in the early years (Knudsen, Heckman, Cameron & Shonkoff, 2006). The development of neural circuits during early intervention experiences can also mediate gene expression, which in turn can also impact the synaptic connections, hormonal expression and neurotransmitters present in the child's brain (Kandel, 2001; Knudsen, Heckman, Cameron & Shonkoff, 2006).

Apart from its positive impact on child development, early intervention has also been found to decrease later costs of an individual child upon the educational system (Knudsen, Heckman, Cameron & Shonkoff, 2006). Also, these early interventions have demonstrated financial benefits such as improvements in personal income and home ownership, as well as reductions in need for government assistance, and reduced involvement in the legal system.

Perhaps most importantly, the positive effects of enriching early intervention experiences have been found to be independent of IQ. Personal qualities, however, such as motivation, temperament and social competence as well as other aspects of well-being do seem to play a significant role in the benefits a child gains from such experiences (Currie & Blau, 2005).

Although still beneficial, interventions targeting children during later years and into adulthood have had limited success and yielded low economic returns (Cunha, Heckman, Lochner, Masterov, 2005; Knudsen, Heckman, Cameron & Shonkoff, 2006). However, the majority of results indicate that children are able to maintain the cognitive, social, emotional and neurological benefits of early intervention best when such interventions include beneficial learning experiences after the initial intervention concludes (Knudsen, Heckman, Cameron & Shonkoff, 2006).

In conclusion, early intervention experiences critically benefit children's long-term outcomes by positively impacting their social, emotional and neurological development during a time in which brain structures are highly vulnerable to a variety of environmental influences. Such interventions have the potential to save educational systems a significant amount of money in addition to fostering the skills necessary for children to grow into high functioning adults.

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