Can Sport and Physical Activity Participation Be Utilized as an Intervention to Mitigate the Negative Effects of Poverty on Brain Function?

Jesse Mala, University of Connecticut  
Jennifer McGarry (Advisor), University of Connecticut

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According to the U.S Census bureau, there were approximately 46.7 million individuals living in poverty in the United States in 2014 (DeNavas-Walt & Proctor, 2015). Experiencing poverty as a child can even lead to lifelong impairments in learning, behavior and health (Shonkoff & Garner, 2012). In the technical report by Shonkoff & Garner (2012), the authors build off of Bronfenbrenner's ecological systems theory and present an ecobiodevelopmental framework that illustrates how experiences in childhood can leave a “signature” on genetic predispositions that affect brain architecture and health. The authors elucidate how the impacts of toxic stress beginning as early as the prenatal period to early childhood can have lasting impacts on learning, behavior and both physical and mental well being.

Research shows the role of socioeconomic status (SES) on brain development and function and its impact on academic achievement. In 2015, Hair et al. found that children from low SES's displayed systematic structural differences in the frontal lobe, temporal lobe, and the hippocampus when compared to their peers from higher SES. Researchers have also found that children from low SES’s performed worse in verbal and math problems and had reduced working memory and poorer executive function (Jordan et al., 1994, Noble et al., 2005, Farah, et al., 2006). It is clear that brain development and executive function among children from low SES’s is negatively impacted.

Although low SES and poverty have a negative impact on brain development and function, exercise and physical activity have been shown to have a positive impact on brain development and function. A burgeoning amount of studies demonstrate that physical activity and aerobic fitness positively impact brain structure and function, specifically the prefrontal cortex which is primarily responsible for executive function tasks. Davis et al. (2011) assessed the effect of 3 months of physical activity on executive function and found that exercise enhanced executive control tasks and achievement in math, even though no math instruction was given. Furthermore, the enhancement in executive control tasks and math achievement were in a dose-dependent manner, meaning groups who exercised for longer periods of time (40 min.) received more improvement in executive control and math achievement versus individuals who exercised for shorter periods of time (20 min.) (Davis, et al., 2011). Lastly, Hillman et al. (2014) assessed the effect of a 9-month physical activity afterschool program on executive control in 8-9 year olds. Participants who received the intervention demonstrated greater improvement in attentional inhibition and cognitive flexibility than the control group who did not receive the intervention. These studies show how participating in sport and exercise programs can positively affect executive function among youth, which has positive academic implications.

Utilizing Bronfenbrenner’s ecological systems theory as the framework to examine the phenomena of the immediate environment impacting executive function can elucidate factors that foster or hinder executive function development. Although poverty is a known factor that is detrimental to executive function, can participation in a sport intervention mitigate the negative effects of poverty on executive function? Research has yet to examine the cognitive effects of sport participation among youth in poverty.

Conducting this research would contribute to the youth sport, physical activity, community sport and sport development literature. Findings from this potential study would emphasize the importance of sport participation on brain function development and would also urge sport management professionals to provide greater opportunities for sport, especially among communities in poverty. By providing more opportunities to participate in sport, sport organizations can positively impact their communities socially, physically, and cognitively.