

Using neuroscience-informed policy to attenuate the income achievement gap

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Abstract

Differences in socioeconomic status (SES) and the experiences that come with being of either high- or low-SES have led to the existence of the income achievement gap. The income achievement gap is associated with disparities in behavioral, electrophysiological, and neural measures between children of high- and low-SES. Being of low-SES is associated with poorer academic achievement, more negative outcomes in adulthood, reduced neurocognitive function, and differences in brain anatomy, relative to being of high-SES. This paper supports the attenuation of the income achievement gap and encourages that policymakers adopt a neuroscience-informed approach to generating legislation. Doing so will help to remove the seemingly income-dependent prerequisite of academic success and high-quality of life.

Keywords: socioeconomic status, income achievement gap, neuroscience, policymakers, legislation

Introduction

Socioeconomic status (SES) can be defined by means of economic and intellectual resources, such as income and education, and social factors such as societal power, reputation, and social class.¹² People can be divided into two groups based on the aforementioned criteria, namely, there are people of high-SES and people of low-SES. Those considered to be of high-SES typically have higher income and education levels, greater societal power, a more positive reputation, and are considered to be of a higher social class, whereas those considered to be of low-SES have lower income and education levels, less societal power, a more negative reputation, and are considered to be of a lower social class. These contrasting experiences have the potential to create serious distinctions between the two groups. For example, differences in SES have led to the existence of the income achievement gap, which is a term used to describe the variability in academic achievement that students exhibit as a function of income.³

The income achievement gap has behavioral, electrophysiological, and neural effects on a developing child. With regard to behavior, students from low-SES homes suffer from lower scores on standardized tests (fig. 1c), lower oral reading ability, and poorer language skills.⁴⁵⁶⁷ It is simple to see how poor performance in these cognitive domains could potentially translate into substandard academic success.

Electrophysiological and neural measures can also be utilized to understand the effects of the income achievement gap on children. In general, children from low-SES homes show disparities in neurocognitive function and differences in brain anatomy, relative to children from high-SES homes. Methods that measure electrical brain activity, namely electroencephalography (EEG), have revealed that children from low-SES homes show greater attention to unattended stimuli than to attended stimuli.⁸ This suggests that these children are having a hard time paying attention to relevant stimuli in their environments, which can have major implications in school settings. With respect to brain anatomy, structural and functional magnetic resonance imaging (MRI) research has shown that children from high-SES homes have greater cortical gray matter, cortical thickness, volumes of amygdala and hippocampus, and greater brain surface area, relative to children from low-SES homes.⁹¹⁰¹¹ Together, these anatomical characteristics are correlated with increased memory ability, improved social-emotional processing, and better executive function.¹²¹³¹⁴ These

electrophysiological and neural data help to explain why children from high-SES homes show greater academic achievement. It must be noted that these data should in no way be used to blame or pathologize those of low-SES. Rather, these data should be considered insight into how the income achievement gap penetrates beyond behavioral outcomes.

The problem with the income achievement gap is not only that children from low-SES homes are performing more poorly in school, but that their brains are developing differently, as well.¹⁵ Even more concerning is the fact that this gap is widening, meaning the divergence between the two groups of students is becoming even more pronounced.¹⁶ The gap between children of high- and low SES was 30 to 40 percent greater in those born in 2001 than those born in 1976.¹⁷ I advocate that politicians make efforts to attenuate the income achievement gap, as doing so would provide all students with an equal opportunity to succeed.

Neuroscience-informed policy

As previously mentioned, the income achievement gap results in behavioral, electrophysiological, and neural differences between children of high- and low-SES. These differences have real-life implications for the lives of children from low-SES homes, such as shorter life expectancy (fig. 1a) and increased mood disorder symptoms later in life (fig. 1b).¹⁸ With that in mind, reducing the income achievement and its negative effects should be a priority of the government. While I recognize that the legislative process is not simple, I advise that politicians adopt a neuroscience-informed approach to generating policy in order to solve the issue of the income achievement gap.

The advantage of neuroscience research, over traditional behavioral research, is that neural measures have the ability to detect differences between individuals that do not appear to differ behaviorally.¹⁹ With that said, researchers within the field of neuroscience have begun to investigate ways to improve the lives of children from low-SES backgrounds via family-based interventions, social support, and financial assistance. Each of these methods has the potential to influence policy.

Family-based interventions that focus on teaching parents positive parenting skills and changing features of the home, such as the bedtime routine, have been shown to improve attention and

behavior of children from low-SES backgrounds.²⁰ Thus, when choosing how to intervene, it might be helpful to use a more overarching approach, as opposed to an intervention targeting children alone. With regard to social support, it has been shown that additional support from teachers, classmates, and schools moderates academic performance.²¹ Therefore, we should be instructing teachers and schools to change the nature of their classrooms to provide more support to their students, especially those that are of low-SES. Lastly, there is currently an ongoing study researching the effects of providing cash stipends to families of low-SES. If the results from this study are positive, this could serve as inspiration for government intervention.²²

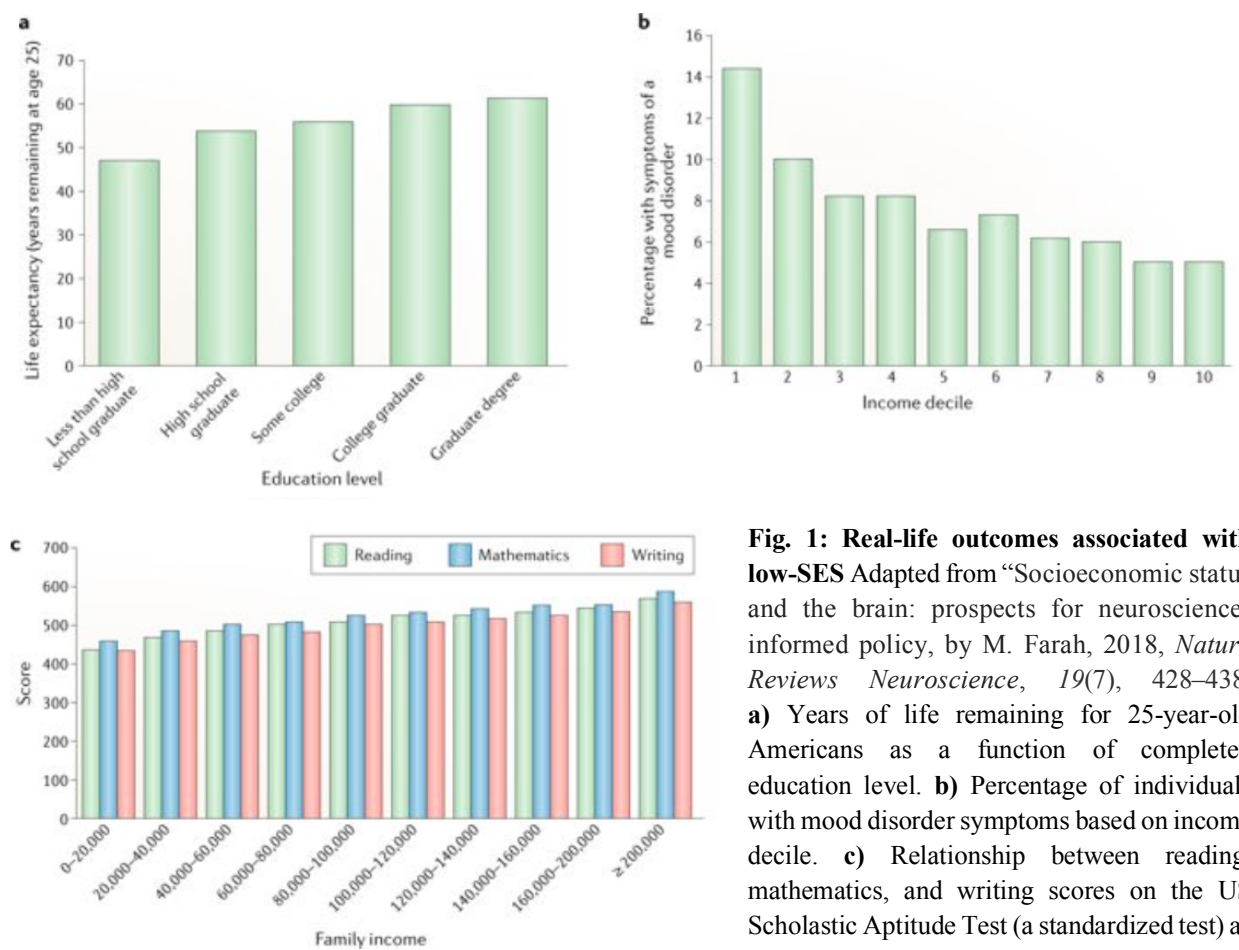


Fig. 1: Real-life outcomes associated with low-SES Adapted from “Socioeconomic status and the brain: prospects for neuroscience-informed policy, by M. Farah, 2018, *Nature Reviews Neuroscience*, 19(7), 428–438. **a)** Years of life remaining for 25-year-old Americans as a function of completed education level. **b)** Percentage of individuals with mood disorder symptoms based on income decile. **c)** Relationship between reading, mathematics, and writing scores on the US Scholastic Aptitude Test (a standardized test) as a function of family income.

While there are critics that question the ability for neuroscience research to have educational applications²³, I have compiled three ways in which the field of neuroscience has the potential to attenuate the income achievement gap that exists between children of high- and low-SES., namely,

family-based interventions, social support, and financial assistance. I recommend that politicians use these methods as models to create more informed policy.

Conclusion

The income achievement gap is associated with behavioral, electrophysiological, and neural disparities between children of high- and low-SES. In the short term, these differences are associated with distinct academic achievement, but the effects of this gap do not end there. These differences have the power to influence life expectancy and mental health in the long term, therefore affecting a person's quality of life overall. It is morally wrong to accept the social and economic system responsible for producing the income achievement gap, thus, I urge politicians to strive to attenuate, and eventually eradicate, the income achievement gap through the use of neuroscience-informed policy.

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