

Adverse Childhood Experiences, Poverty, and Inequality: Toward an Understanding of the Connections and the Cures

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Abstract

Despite Alfred Marshall's early recognition of the importance of mothering, human capital theory scarcely reflects the role of the home environment as a factor influencing the production of human capital. This paper looks deeply into the earliest phase of child development to understand its implications for human capital theory. Recently, important noneconomic research has revealed the growth of adverse childhood experiences (ACEs) among young children and how this impairs their brain functioning. Accordingly, this paper explores the role of ACEs for understanding the growth of poverty and inequality.

In contrast to other socio-economic theories explaining the growth of inequality of academic achievement, this paper focuses on the magnitude and growth of ACEs and poor parenting within the lower socio-economic class. Other theories no doubt have some validity, but if they leave out ACEs, they are missing a crucial causal factor. The implications of this theory for remedies to ACEs are explored. These remedies involve different ways to build human capital during the early childhood so that children will arrive at school with their brains unimpaired. The caring work of making human capital investments works better if they are part of a caring economy and part of a sensible human capital strategy.

Key Words: Adverse childhood experiences, human capital, noncognitive human capital, neuro development, educational inequality, early childhood development

1. Introduction

In 1890, Alfred Marshall wrote: "The most valuable of all capital is that invested in human beings; and of that capital the most precious part is the result of the care and influence of the mother" (as quoted in Cunha and Heckman 2009, p. 321). Despite Marshall's early recognition of the importance of mothering, modern day human capital theory scarcely reflects the role of parents and the home environment as factors influencing the production of human capital. Also, there has until recently been relatively limited understanding of what schooling actually does. "In the traditional investment model, schooling itself is often treated as a black box: individuals enter, something happens, and productivity ... increases" (Oreopoulos and Salvanes 2011, p. 159). The purpose of this paper is to look more deeply into the earliest phase of child development, from birth to two or three years of age, in order to understand the implications of this development for human capital theory. Recently, important noneconomic research has revealed the growing prevalence of adverse childhood experiences (ACEs) among young children and the role this plays in impairing their brain functioning and contributing to later age physical and mental ailments. Accordingly, this paper explores the role of ACEs for understanding poverty and the growth of inequality of both income and academic achievement. In doing this, the paper, of course, reviews the important contributions of James Heckman and his colleagues. Further, this paper attempts to build on Heckman's contributions and to add new human capital understandings related to ACEs and early childhood development. Finally, the paper develops some implications of these understandings for remedies for ACEs.

¹ John Tomer is Emeritus Professor of Economics at Manhattan College, Riverdale, NY 10471. The author has no personal or professional links that could bias his treatment of his subject. The author is very grateful to Betty Devine for her comments on an earlier version of this paper. This paper has not been previously published, is not currently under review at another journal, and will not be submitted to another journal.

2. Economics, human development and the human brain

The limitations of human capital theory

Economics no doubt has been greatly enriched by the development of human capital theory. Unfortunately, however, this theory has been built upon a limited conception of human development. For the most part, human capital theory has emphasized human cognitive development and human acquisition of knowledge and skills that enable enhanced productivity and earnings. Further, human capital research has emphasized human capital formation taking place in schools in children five years old and older and in workplaces. In light of recent research findings, particularly that concerning brain development, it is becoming apparent that economics' human capital theory has a far too limited conception of human development, especially with regard to its relative neglect of noncognitive development and the brain development that takes place in early childhood. Further, human capital theory needs to incorporate the kinds of insights and theory concerning intangible capital which are developed in my earlier research (Tomer 2008).

The importance of early childhood development

Human brain development in early childhood

In contrast to the relatively even growth of one's physical body until about age 20, one's physical brain growth is most rapid from its time in utero until age four. At four years old, the human brain is ninety percent of adult size (Perry and Szalavitz 2006, p. 247). Despite this early rapid physical growth, the brain's growth at age four is far from finished; a great deal of brain development and organization takes place during later childhood and adolescence as the brain's systems become more complex and major cortical restructuring occurs. But the early childhood period is extremely important for neurodevelopment because it is a period when the brain is very sensitive to experience. Thus, it is a time of great malleability and vulnerability (Perry 2002, p. 82). Favorable development at this time makes possible the later realization of many human potentials. If, however, the young child experiences severe neglect and trauma, this can have a destructive effect and may close off the development of important later potentials.

The human brain develops sequentially starting with the brain stem, followed by the midbrain, then the limbic system, and then the cortex. This implies a hierarchical ordering from lower to higher brain regions. Each area of the brain specializes in different functions. The brainstem deals with the relatively automatic functioning related to, for example, body temperature, heart rate, and blood pressure. The midbrain deals with bodily functions which we have some control over such as appetite and sleep. The limbic system deals with emotional reactivity, sexual behavior, and attachment. The cortex deals with abstract thought, concrete thought, executive functions, and affiliation, among other things (Karr-Morse and Wiley 2012, p. 98; Perry and Szalavitz 2006, p. 248). "In order to develop properly, each area requires appropriately timed, patterned, repetitive experiences" (p. 248). This means there are time periods (sensitive periods) when experience can easily modify the biochemistry and architecture of neural circuits in particular parts of the brain. There are also critical periods, limited time periods when certain crucial kinds of brain development can only occur (Cunha and Heckman 2009, p. 331; see also Perry 2002, p. 87). Optimal development of the higher, more complex brain functioning requires healthy development experience in the lower, less complex brain systems in the right amounts and in the right sequence.

Parenting and the external environment

Why do some children grow up to be productive, responsible, kind people, and others become unproductive and abusive? An important part of the answer relates to the kind of early parenting that some children receive. Children need consistent, physical affection and need patterned, repetitive stimulation "to properly build the systems in the brain that connect reward, pleasure and human-to-human interactions" (Perry and Szalavitz 2006, p. 86). To realize their brain development potential, young children's brains need both quality and quantity of use and stimulation (Karr-Morse and Wiley 2012, p. 98). "It takes a modulated adult to monitor and balance newborn over- or under- arousal and help regulate ... [their] raw and reactive systems"

(p. 100). Sometimes this requires swaddling and soothing; at other times it requires lively stimuli. In addition to being safe, nurturing, predictable, repetitive and gradual, it is important for parental care to be attuned to the child's developmental stage (Perry and Pollard 1998, p. 37). Crucial to early childhood development is the forging of a strong attachment relationship between the child and the parent(s). The attachment relationship is something that develops over time in the presence of a committed, loving caregiver (Karr-Morse and Wiley 2012, p. 193; Perry and Szalavitz 2006, pp. 85-86). In addition to providing a safe, stable base, parents need to allow the child to explore his or her world, and thereby, develop resilience which enables them to do well in the face of external stressful situations (Perry and Pollard 1998, p. 40).

Stress and trauma

A child is subject to stress when he or she is exposed to dramatic, rapid, unpredictable changes to his or her environment which are likely to be upsetting and which may make returning to homeostasis difficult (Perry and Pollard 1998, p. 35). Trauma occurs when the stressful event is severe enough to disrupt the physical and emotional balance and security provided by the child's primary caregiver (Karr-Morse Wiley 2012, p. 103). Trauma is overwhelming stress; it is in excess of what the child can manage or bear (p. 24). Instead of inducing a fight or flight response, trauma is typically followed by freezing or dissociation (p. 25). The traumatized child is unable to restore his or her previous equilibrium. The new equilibrium is generally less favorable, less flexible, consumes more energy, and is maladaptive (Perry and Pollard 1998, p. 36).

If, instead of attuned, loving parenting, the caregiving is inconsistent, inattentive, chaotic, ignorant, abusive, or neglectful, this can be a source of stress or trauma that may adversely affect the child's brain development. Such adverse brain development has been documented through the use of advanced neuroimaging techniques (Perry 2002, p. 93). These techniques, for example, have shown dramatically different brain images for normal children compared to the brains of children experiencing extreme sensory neglect. Poor, neglectful childcare, which is experienced early and chronically, is the cause of dysregulation of the child's hypothalamic-pituitary-adrenal (HPA) axis (Karr-Morse Wiley 2012, p. 236). Such dysregulation is associated with exaggerated reactivity, overly sensitive, maladaptive emotional, behavioral, and cognitive problems (sensitization) (Perry and Pollard 1998, p. 42). A child who is constantly being overstimulated by internal or external reminders of unhappy events will find it extremely difficult to pay attention to classroom learning (Karr-Morse and Wiley, pp. 37-38). "For these youth, ... delayed gratification is almost impossible. They are quite literally unable to consider the potential consequences of their behavior" (Perry and Szalavitz 2006, p. 250). Also these children tend to function at their most primitive level of self-interest (Karr-Morse and Wiley 2012, pp. 247-248). A calm, untraumatized child processes information quite differently than such a traumatized, sensitized child. "The calmer child can more readily focus on words of the teacher and, using her neocortex, engage in abstract thought and reasoning" (Perry and Szalavitz 2006, 249).

Adverse childhood experiences

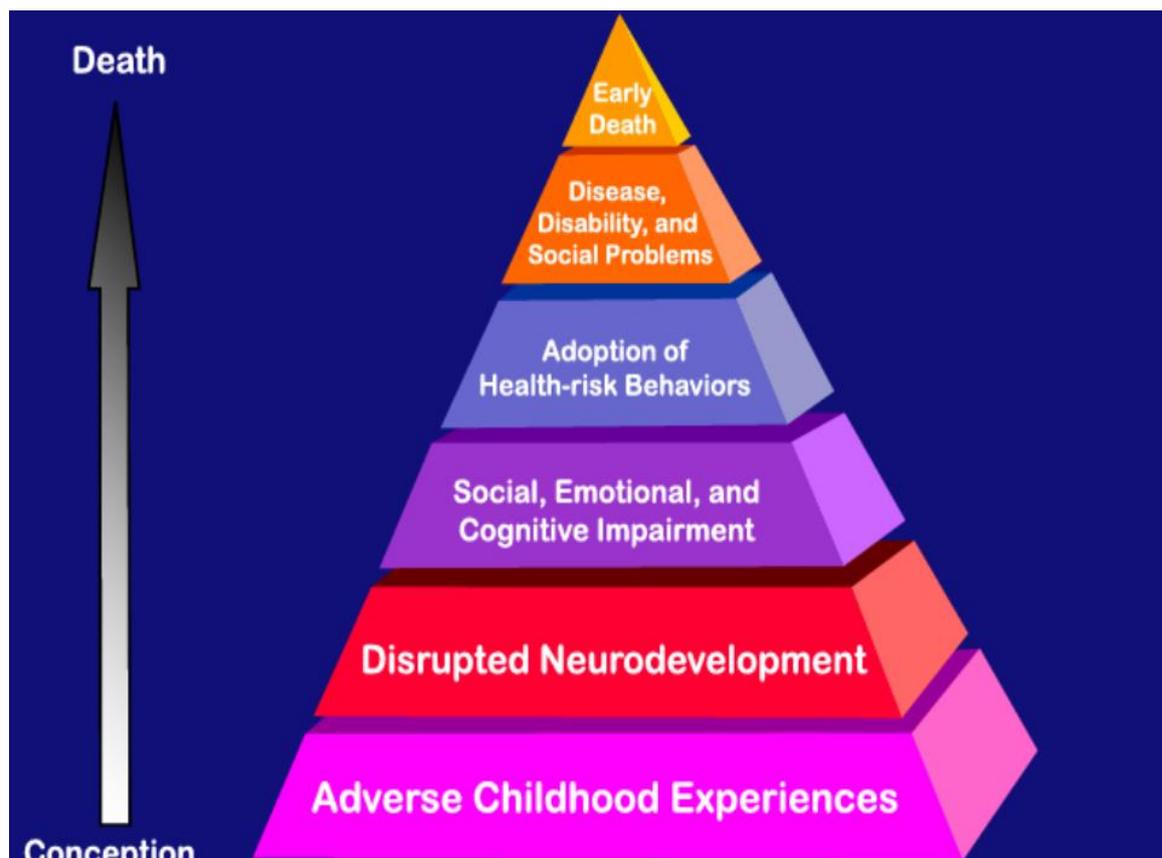
In the early 1990s, Robert Anda and Vincent Felitti with the aid of the Kaiser Health Plan and the Centers for Disease Control pioneered a large empirical study of the relationship of adults' adverse childhood experiences (ACE) to these adults' physical and mental health and behaviors. The ACE studies focused on the ACE Score, "the number of 'yes' responses to questions about each of ten ACE categories (not incidents) that include: emotional, physical, and sexual abuse, emotional and physical neglect, witnessing domestic violence, growing up with mentally ill or substance abusing household members, loss of a parent, or having a household member incarcerated" (Larkin et al 2012, p. 264). Findings from the ACE studies demonstrate strong relationships between these adults' ACE scores and many health and social problems throughout their lives. In general, the research found that "ACEs are common, highly interrelated, and exert a powerful cumulative impact on human development" (p. 264). The findings support the view that "childhood stressors, such as abuse, affect the structure and function of the brain" (p. 265). The studies also show that ACEs are related to prevalent diseases (heart disease, cancer, lung disease...), health risk factors (smoking, alcohol abuse, promiscuity...), mental health (depressive disorders, anxiety, hallucinations...), and general health and social problems (p. 265; Anda et al 2006).

The link between childhood trauma, as indicated by one's ACE score, and adult outcomes is

striking. “People with an ACE score of 4 were seven times more likely to be alcoholics as adults than people with an ACE score of 0. They were six times more likely to have had sex before age 15, twice as likely to be diagnosed with cancer, four times as likely to suffer emphysema. People with an ACE score above 6 were 30 times more likely to have attempted suicide” (Brooks, *NY Times* 2012). As part of their ACE research, Felitti and Anda examined the “relationship of childhood abuse and household dysfunction to many causes of death in adults” (Felitti et al 1998). They found a graded or linear relationship between the number of ACEs and each of the adult risk behaviors and diseases studied. Persons who had 4 or more ACEs, compared with those with none, had 4 to 12 fold higher risk of alcoholism, drug abuse, depression, and suicide attempts (p. 245). A study by Dube et al (2003) examined the relationship of ACEs to 6 health problems among 4 successive birth cohorts dating back to 1900. Again, the results indicated a consistent, strong, graded relationship, a long-lasting one, between adults’ ACE scores and their health problems (p. 268). They found these results to be “consistent with emerging information about the neurobiological effects of early traumatic experiences on the developing brain of infants and young children” (p. 274).

The pyramid in Figure 1 below summarizes the essence of the findings from the ACE research studies.² The occurrence of ACEs lead to disrupted neurodevelopment, which leads to social, emotional and cognitive impairment, leading to the adoption of health-risk behaviors, further leading to adult disease, disability and social problems, all of which lead to early death.

Figure 1: Influences of Adverse Childhood Experiences Throughout the Lifespan



Source: Heather Larkin’s Powerpoint Presentation, March 27, 2013

² The initial version of this figure appeared in Felitti et al (1998, p. 256). The current revised version was obtained from workshop handouts (April 2013) prepared by Heather Larkin of the School of Social Welfare, State University of New York, Albany.

3. Implications for human capital theory

James Heckman's contributions

James Heckman and his coauthors have over the last 15 years or so done much research related to early childhood human capital formation. There is no doubt that Heckman is the clear leader in this area. These research efforts have led to numerous new important insights, many of which are at odds with mainstream human capital theory. The following is a short list of important insights deriving from this research:

1. The human brain capacities developed in early childhood are crucial for the subsequent successful development of other brain capacities in later childhood and adulthood (Heckman 2007, p. 13253; Heckman 2008, pp. 311-312; Heckman 2004, p. 197; Knudsen et al 2006, pp. 10155, 10156, 10158).
2. These crucial human brain capacities require development during certain sensitive or critical periods of early childhood (Heckman 2006, p. 1900; Knudsen et al 2006, pp. 10155, 10158, 10160).
3. The human capacities developed during early childhood are largely noncognitive ones such as self-regulation, self-control, motivation, low rates of time preference, far-sightedness, conscientiousness, adventurousness, perseverance, and tenacity that reflect the organization and regulation of the brain occurring during this time (Heckman 2007, pp. 13250, 13252).
4. The family is the major producer of human capacity in early childhood. A major factor that explains the variation among persons in human capital formation in early childhood is the quality of the child's home or family environment, which reflects the behavior of the parents. Successful family functioning in early childhood enables development of the child's human capacity, capacity that cannot be duplicated by later schooling. Adverse family environments lead to serious deficits in human capital formation during early childhood. These deficits reflect abnormal development of children's brains which can be detected by brain imaging technology (Heckman 2007, p. 13251; Heckman and Masterov 2007, pp. 447-448, 487; Heckman 2008, pp. 290, 314; Heckman 2006, pp. 1900-1901; Heckman 2004, p. 180; Knudsen et al 2006, p. 10161).
5. Adverse family environments are typically characterized by the absence of a father, low financial resources, low parental education, poor parenting skills, lack of cognitive and emotional stimulation, among other things (Heckman 2007, p. 13251; Heckman and Masterov 2007, p. 448; Heckman 2008, pp. 304-305).
6. In recent years, relatively more children are being raised in adverse environments (Heckman and Masterov 2007, p. 487; Heckman 2008, pp. 289-290, 301-302, 306; Knudsen et al 2006, p. 10155).
7. There is evidence that the rate of return on investment in human capital in early childhood is much greater than the rate of return on investment in human capital during later childhood and adulthood. Making early childhood investments in disadvantaged children is not only the fair thing to do but the societal rate of return to early childhood investment in disadvantaged children is relatively high. So it makes sense from a productivity standpoint (Heckman 2007, p. 13252; Heckman 2008, p. 311; Heckman 2006, pp. 1901-1902; Knudsen et al 2006, p. 10161).
8. The big issue raised by these insights is: What should society do to deal with the presence and growth of adverse family environments that are leading too many people to enter adulthood with low human capital endowments? (Heckman and Masterov 2007, p. 448).

Further human capital implications

As far as I have been able to discern, Heckman does not mention the research on adverse childhood experiences. He does consider adverse family environments, poor parenting, and some of their detrimental effects, but he does not consider, at least not explicitly, ACEs, the trauma they cause, and how they severely affect the young brain. As a result, his conception of the importance of early childhood development is missing a major factor. Including ACEs in the analysis would, if anything, strengthen his analysis and policy recommendations. Moreover, the parental role in human capital formation needs more emphasis and elaboration. Accordingly, it is important to appreciate that parents not only need to prevent ACEs and other highly stressful events from impacting their children, but, to allow their child to reach his or her full potential, they need to be a nurturing, committed, attuned, consistent, loving caregivers. This parental role is extremely important, particularly in the first three years of the child's life. If things do not go well then, it will undoubtedly compromise later developmental possibilities.

Authors such as Bruce Perry and Robin Karr-Morse who are both therapists and students of brain functioning, realize that the very early years are the ones in which the child's brain is becoming organized and regulated. If this process goes poorly, the child may enter school behaving badly due to exaggerated reactivity and sensitivity, and thus, they may not be able to have a good balance of cognitive and noncognitive behavior and learning, the kind that allows them to have a satisfactory schooling experience, and which provides the basis for their next learning stage and ultimately their worklife. Without appreciation of the importance of the early years for developing balanced brain capabilities, recommendations for human capital policy are likely to be inefficient. That is, they are likely to ignore the importance of early childhood and devote too much investment to human capital formation in the later childhood years, particularly to cognitive human capital formation, in a mistaken hope that later schooling can make up for the missing brain development and noncognitive human capital formation during the early years.³

Children who chronically behave badly because their brain development went poorly in early childhood can be said to lack the kind of personal capital associated with emotional intelligence (see Tomer 2008, Chapter 6). Because their brains failed to develop in a healthy way, these children typically lack the ability to manage or regulate their own emotions and the ability to manage their relationships with others. In other words, such children lack emotional intelligence, a variety of personal and social competencies which are critical to educational and work achievement, and thus these children can be said to have a low personal capital endowment.

Current trends in inequality

Careful observers of trends in socio-economic inequality such as Charles Murray (2012) and Brink Lindsey (2013) have recently discerned a distinct polarization among classes. In Murray's examination of this issue, he focuses on the trends among white people since the early 1960s and finds it useful to compare the upper-middle class (top 20 percent) with the new lower class (bottom 30 percent). On many dimensions, he finds that the upper-middle class is doing relatively well; whereas the new lower class is clearly in decline. The data show polarization in the labor market as well as cultural polarization between these two classes. For example, with respect to the personal quality of industriousness, the data show that from 1970 to 2010, the percent of prime age males not in the labor force grew substantially for the bottom 30 percent relative to the top 20 percent group (Murray 2012, p. 173). Over a similar time period, for the bottom 30 percent, the percent of males with jobs who worked fewer than 40 hours in the preceding week grew significantly relative to the top 20 percent class (p. 176). And for the bottom 30 percent, the male unemployment rate compared to the national unemployment rate grew very substantially relative to the top 20 percent group (p. 175). Thus,

³ Tomer generally uses the term personal capital to refer to the developed personal qualities that reflect important aspects of an individual's functioning. Heckman, on the other hand, seems to prefer the term, noncognitive human capital. "The difference between the two is that Heckman's category is largely defined by what it is not, that is, it is not cognitive. Whereas personal capital, although largely noncognitive is defined in a more positive way, that is, personal capital is defined in terms of the specific human qualities or categories of qualities that it contains" (Tomer 2008, pp. 20-21).

for a variety of reasons, males in the bottom 30 percent class had a substantially worse labor market experience than the top 20 percent which in part reflects, Murray argues, the declining industriousness of the lower middle class.

The data also supports the view that the marriage experience of the new lower class is worsening, especially relative to the upper-middle class. In 2010 the percent of whites ages 30-49 who were married among the lower 30 percent was about 50 percent compared to about 85 percent for the top 20 percent (Murray 2012, p. 154). In 1960 the respective figures were 86 and 96 percent. With regard to the percent divorced or separated, the rate for the new lower class has dramatically increased to about 35 percent, while the rate for the upper-middle class has been flat at around 7 percent for the last 30 years (p. 156). There is also a large and growing gap between these two groups in the percent of self-reported “very happy” marriages. Moreover, from a marital standpoint, the divide between the children of the bottom 30 percent and the children of the top 20 percent is large and growing. The percent of children living with a single, divorced, or separated parent for the bottom 30 percent has reached over 20 percent; whereas for the top 20 percent, it is a little over 2 percent (p. 159). Also notable is the large and rising gap between the percent of nonmarital births among mothers with 12 years or less education and mothers with a college education (p. 161). Among the new lower class, all too often, the men are not making a living and single women are raising the children. In addition, Murray has made similar comparisons illustrating the absolute and relative decline of the new lower class in regard to the qualities of honesty (including crime) and religiosity.

Reflecting the cultural differences between the two classes, childrearing practices are sharply different between the two groups.

“The children of the new upper class⁴ are the object of intense planning from the moment the woman learns she is pregnant. She sets about researching her choice of obstetrician immediately (if she hasn’t already done it in anticipation of the pregnancy), and her requirements are stringent. She does not drink alcohol or allow herself to be exposed even to secondhand smoke during her pregnancy. She makes sure her nutritional intake exactly mirrors the optimal diet and takes classes (along with her husband) to prepare for a natural childbirth—a C-section is a last resort. She gains no more and no less than the prescribed weight during her pregnancy. She breast-feeds her newborn, usually to the complete exclusion of formula, and tracks the infant’s growth with the appropriate length and weight charts continually. The infant is bombarded with intellectual stimulation from the moment of birth, and sometimes from the moment that it is known that conception has occurred. The mobile over the infant’s crib and the toys with which he is provided are designed to induce every possible bit of neural growth within the child’s cerebral cortex” (Murray 2012, p. 39).

On the other hand:

“Mainstream America is a lot more relaxed than the new upper class about their children. I don’t mean that other American parents care less, but that, as a group they are less inclined than upper-class parents to obsess about how smart their baby is, how to make the baby smarter, where the baby should go to preschool, and where the baby should go to law school. They buy the car seat that’s on sale at Walmart instead of spending hours searching the web for the seat with the best test results in simulated head-on collisions. When their children get into trouble at school, they are less determined than upper-class parents to come up with reasons why it’s the teacher’s fault, not their child’s” (Murray 2012, p.41).

The sociologist Annette Lareau in her 2003 book *Unequal Childhoods*:

“has identified a clear, class-based difference in parenting styles. Among the poor and working-class families she observed and studied, the focus of parenting was on what she

⁴ The new upper class is the upper segment of the upper-middle class.

calls 'the accomplishment of natural growth.' In these families, 'parents viewed children's development as unfolding spontaneously, as long as they were provided with comfort, food, shelter, and other basic support.' By contrast, for middle-class families with college-educated parents, the aim is 'concerted cultivation.' 'In these families,' Lareau writes, 'parents actively fostered and assessed their children's talents, opinions, and skills. They scheduled their children for activities. They reasoned with them.... *They made a deliberate and sustained effort to stimulate children's development and to cultivate their cognitive and social skills*' (Lindsey 2013, p. 65).

Toward a new behavioral economic model explaining inequality

One important part of the educational gap between the children of the upper-middle class and those of the new lower class is the more intensive parenting styles of the upper group. "High-income families are increasingly focusing their resources—their money, time and knowledge of what it takes to be successful in school—on their children's ... educational success" (Reardon, *NY Times* April 27, 2013). They are definitely spending more time on child care (Lindsey 2013, p. 64). And it is paying off.

"Students growing up in richer families have better grades and higher standardized test scores, on average, than poorer students; they also have higher rates of participation in extracurricular activities and school leadership positions, higher graduation rates and higher rates of college enrollment and completion" (Reardon, *NY Times* April 27, 2013).

Much of the widening gap is because the children of the upper and upper-middle groups are increasingly entering kindergarten better prepared than the middle or lower class kids, and the gap persists throughout their schooling. This indicates the central importance of early childhood experience.

The other important part of the educational gap relates to the family environments of the new lower class. As indicated earlier, family break up has become increasingly common in this lower group as indicated especially by the growth in the percent divorced or separated and the growth in the percent of children living with a single parent, usually the mother. Such single-parent families are not well off. "The median family income for single mothers—who are more likely to be younger, black or Hispanic, and less educated—is \$23,000 (Rampell, *NY Times* May 29, 2013). Never-married mothers (whose numbers in the new lower class have grown dramatically) have even lower incomes than those who are divorced or widowed. According to economist David Autor, research shows that lower-income children raised by their mothers are at a particular disadvantage; this is especially true for their sons who on the average are believed to get fewer hours of attention from their mothers than their daughters do (Appelbaum, *NY Times* March 20, 2013). Single mothers who generally have to work are often stressed and generally do not have a great deal of time or money to devote to child care, much less trying to give their children the special advantages that upper class children receive. In light of the above, one suspects that adverse childhood experiences are more prevalent in families headed by single parents. However, at present there is no data directly bearing on this latter issue.

The educational success gap between high- and lower- income students has grown substantially because of what upper class parents are increasingly doing and what lower class parents are increasingly unable or neglecting to do. Of course, higher income families have the monetary resources necessary to purchase the best preschool and childcare not to mention a variety of child enrichment resources and activities. Lower income families, on the other hand, are clearly constrained by the rising costs of education and childcare as well as poor job markets. This means that the children of the new lower class are arriving at kindergarten much less prepared than the children of the more affluent group. And schools, although they have tried, have not reduced this inequality (Reardon, *NY Times* April 27, 2013). Nor is there any convincing evidence that schools have increased the inequality. Thus, there has been much more, and more successful, human capital investment going on among the higher income families, particularly during early childhood. Lower class males, in particular, are apparently not responding to the rising returns to investment in human

capital, especially the rising return to college education (Lindsey 2013, pp. 60-61); Appelbaum, *NY Times*, March 20, 2013). This is hard to understand. However, the analysis here points to two major causal factors. One is that elite culture is very much fostering educational achievement, while lower class culture is moving in the opposite direction (Lindsey 2013, p. 61). Second is the growing family breakup and dysfunction, which there is reason to believe is increasing the prevalence of adverse childhood experiences among the lower class. Unfortunately, data necessary to verify this supposition is not currently available. If ACEs are higher among the lower class, this will no doubt contribute to their children's educational disadvantages, and these disadvantages are not easily remedied.

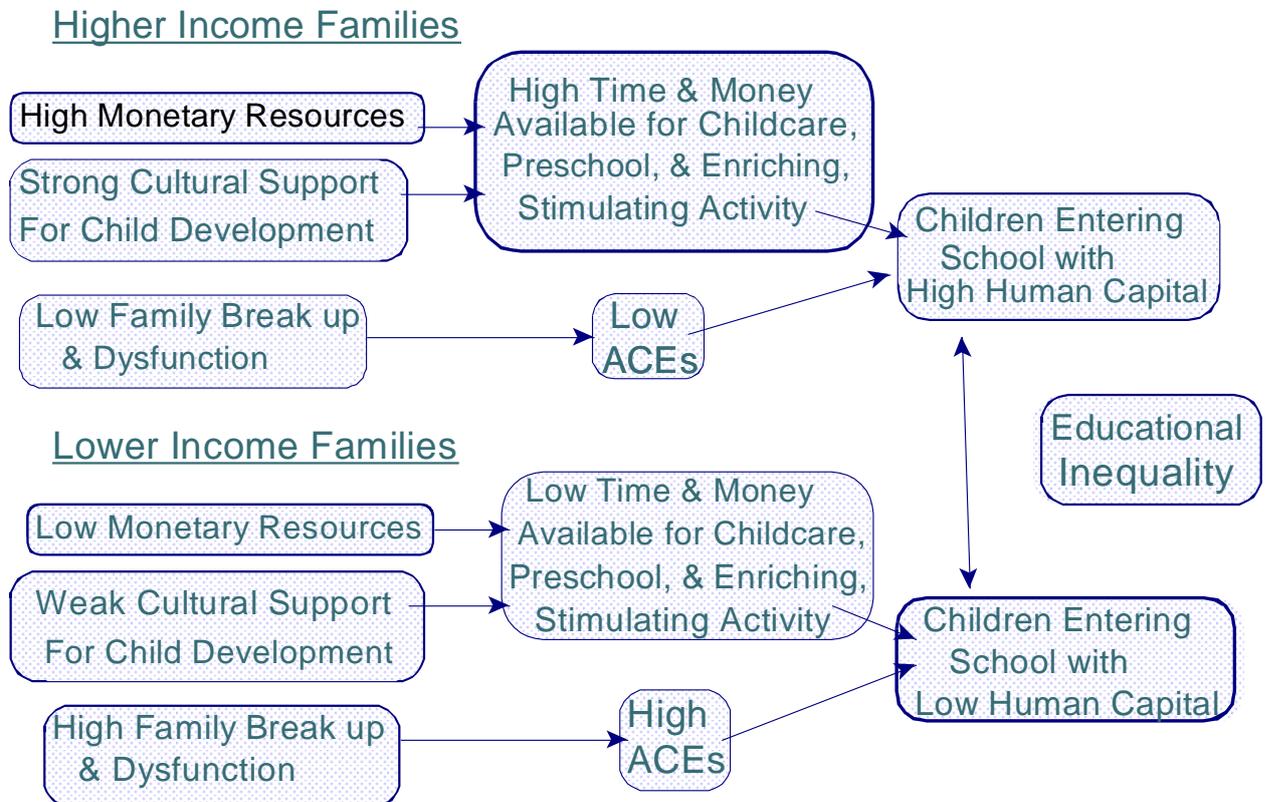
The explanations above constitute in essence a new behavioral economic macro model explaining educational (and income) inequality. The core features of this model are as follows and are displayed in Figure 2 below. For higher income families, high monetary resources and strong cultural support for child development lead to high time and money available for childcare, preschool, and enriching, stimulating activity which contributes to their children entering school with high human capital. Also making the same contribution is this group's relatively lower rates of family break up and dysfunction leading to low rates of ACEs.⁵ For lower income families, low monetary resources and weak cultural support for child development lead to low time and money available for childcare, preschool, and enriching, stimulating activity which contributes to their children entering school with low human capital. Also making the same contribution is the group's relatively high rates of family break up and dysfunction leading to high rates of ACEs. The gap between the human capital endowments of children from higher income families and those of lower income families at school entry constitutes the educational inequality which presumably leads in later years to income inequality. The model offered here is intended to provide an important explanation for inequality, but not necessarily one that is at odds with other worthy explanations such as the ones cited below. It is anticipated that testing the model's main hypothesis will not be an easy task given the current lack of data on the incidence of ACEs among socio-economic classes. Note that in Figure 2, human capital refers to both cognitive and noncognitive human capital - the noncognitive human capital or personal capital arguably being the more significant part in very early childhood.

This paragraph and the next contrast briefly the main argument above concerning the cause of the growth in educational (and consequent income) inequality with competing causal explanations. First, Murray's (2012) account focuses to a great extent on character as the key causal variable. For example, in his analysis, it is the decline of industriousness, honesty, and religiosity of the new lower class that contribute to the rise in their poor behaviors and outcomes such as relatively low income and happiness. Lindsey's analysis, on the other hand, focuses largely on the cognitive ability, especially fluency with abstraction, of the relatively high income elites who invest in this type of human capital that society needs most given the growing complexity of the socio-economy. Lindsey's account gives almost no consideration to the childhood problems or adversities of the lower income groups, but he does briefly mention "the collapse of the traditional nuclear family structure among the less educated" and the "divorce divide along educational lines" as well as pointing to cultural polarization and that many lower income people are not responding to the substantial incentives to invest in needed human capital.

⁵ Strictly, it is hypothesized that higher income families either have relatively low rates of ACEs or that if their ACE scores are similar to lower income families, they do much more to remedy their children's resulting psychological and social deficits arising from these experiences.

Figure 2

Behavioral Economic Macro Model Explaining Educational (& Income) Inequality



In their book review essay article, Acemoglu and Autor (2012) outline a more mainstream economic theory that explains the growth of income inequality among higher, middle, and lower income groups. A key factor in their analysis is the growth of factor augmenting or skill-biased technology. In recent times, this kind of technological change has arguably complemented the skills of high skill workers and has tended to substitute for the skills of middle skill workers. Thus, this technological change leads to an increased demand for high skill workers and a declining demand for middle skill workers as the latter are displaced with the installation of the new technology. In recent periods, the wage premium for high skill relative to middle skill workers has increased. This is the expected result because the supply of high skill workers (with college and post-college education) has not kept up with the demand, whereas the supply of middle skill workers has kept up, or more than kept up, with the sagging demand for them. An important implication of this theory is that there is a great need to improve the efficacy and efficiency of U.S. education at all levels but especially in order to increase the supply of high skill workers (p. 460). This mainstream theory no doubt has validity, but their account leaves no room for alternative considerations relating to noncognitive human capital and to adverse childhood experience. Thus, it fails to come to terms with important reasons for the educational gap between higher and lower income groups, which arguably are elements necessary for a full understanding of inequality and what human capital policies would be most appropriate to deal with it.

4. Toward a cure for the problem

The heart of the problem as outlined earlier is the poor parenting and adverse childhood experiences that sabotage early childhood neurodevelopment leaving children with reduced human capacities for later life learning and work. In contrast to most economists in the human capital field, Heckman and Masterov (2007) understand the essence of what needs to be done.

“It makes sense to invest in young children from disadvantaged environments. Substantial evidence shows that these children are more likely to commit crime, have out-of-wedlock births, and drop out of school. Early interventions that partially remediate the effects of adverse environments can reverse some of the harm of disadvantage and have a high economic return. They benefit not only the children themselves, but also their children, as well as society at large” (p. 446).

Heckman and Masterov point out that postschool remediation programs such as public job training and general educational development (GED) cannot make up for the damage done in early childhood (p. 447). To successfully deal with the problem requires supplementing the childrearing resources of disadvantaged families during early childhood (p. 448). “Millions of parents don’t have the means, the skill or, in some cases, the interest in building their children’s future” (Brooks *NY Times*, February 14, 2013). Therefore, these disadvantaged parents need the special kinds of help that will either enable their children to pass through early childhood with their brain development unimpaired or provide remedial help for the child’s early impairment in order that they can be fully ready for later childhood development and learning.

A remedy for the worst cases

For children who have experienced severe trauma and consequent severe impairment of their neurodevelopment in their early years, the neurosequential approach developed by Bruce Perry, psychiatrist and Ph.D., is a remedy that has worked in many cases. This approach is based on the understanding that neural systems organize and become functional in a sequential manner starting from the lower and proceeding to the higher brain regions (Perry and Szalavitz 2006, pp. 138-139). In the neurosequential approach, the therapist provides the child with “patterned repetitive experiences appropriate to their developmental needs, needs that reflect the age at which they’d missed important stimuli or had been traumatized, not their chronological age” (p. 138). One example is cuddling a seven year old boy, providing the touch and rhythm he had missed as an infant (p. 138). The key is for the therapist to discover the brain regions and functions that are underdeveloped or poorly functioning and then figure out how to help the child gain the missing stimulation or developmental experience (p. 248). In treating a traumatized child, the therapist must create an atmosphere of safety and develop a predictable, respectful, nurturing relationship (p. 154). Another key part of the process is calming the child’s stress response system enabling the child to rely on their higher brain functioning, thereby reducing the child’s sensitization or high arousal time (p. 250).

One of Perry’s significant therapeutic stories is that of Sandy, a girl who witnessed the murder of her mother, had her throat slit, and was left for dead at age 3 (Perry and Szalavitz 2006, pp. 31-56). Not surprisingly, in the nine months until her therapy with Perry began around age four, Sandy suffered from severe mental difficulties. Sandy had profound sleep problems, was pervasively anxious, and had a high startle response, jumping at the slightest unexpected noise (p. 42). Sometimes she had aggressive, tantrum-like outbursts; she was especially afraid of knives; and she had become sensitized (pp. 42-43). An important part of the therapy was for Perry to allow Sandy to reenact the traumatizing experience, thus enabling her to gain tolerance for her traumatized memories, gaining control of her life, and gradually reducing her sensitization. It was a slow process but the reenactments along with the safe, nurturing therapeutic environment were able to transform Sandy and eliminate her symptoms (p. 56). Sometime later, Perry reported that Sandy had “made friends, got good grades, and was notably kind and nurturing in her interactions ... [and is] having the kind of satisfying and productive life we had all wanted for her” (p. 56).

Many other interesting examples of Perry's therapeutic approach to helping children who were early childhood victims of severe neglect and trauma can be found in other chapters of Perry and Szalavitz (2006).

Perry and his colleagues' work helping children overcome their severe victimization is an excellent example of human capital investment in early childhood. But, is this a remedy that can be applied broadly? After all, Perry is an outstanding psychiatrist and innovator in this field. Would it be possible to train enough therapists with sufficient skills to successfully treat all the children in need of this service? Would it make sense to devote a very large amount of resources to this effort? From a purely economic standpoint, the answer depends on the rate of return to this investment. Another way to look at the question is to ask: can we afford the wasted lives and social discord of not making such investments? To definitively answer this question, it is also necessary to consider two broad alternatives to intensive therapy. First are approaches that would prevent early childhood neural impairment from occurring in the first place. Second is utilizing less costly approaches that provide remedies for the many children who are less severely impacted by adverse family environments.⁶

Preventative approaches

As writers in the child development field generally recognize, it is much better to prevent child maltreatment than it is to rely on remedies after it occurs (see, for example, World Health Organization 2006, p. 8). What circumstances would prevent children from experiencing the neglect and trauma that lead to impaired neurodevelopment of their brains? The consensus answer is an environment in which all children lived with both parents who provide a safe, nurturing, loving environment and who have sufficient and relatively secure income sources. Under these circumstances, it is very unlikely that their children would encounter development compromising adverse experiences. This answer suggests the kinds of prevention that are needed. First, poverty (entailing low income) or the threat of it needs to be prevented. Second, low quality parenting needs to be prevented. Third, divorce and separation need to be prevented.

The first type of prevention can be achieved through paid parental leave (Perry and Szalavitz 2006, p. 235; Pressman and Scott forthcoming; Heckman and Masterov 2007, p. 448; Karr-Morse and Wiley 2012, p. 245). The goal of this policy is to overcome poverty in families with infants in order to counter the many negative consequences of poverty, especially for the child and mother (Pressman and Scott forthcoming, pp. 1-11). Paid parental leave can be viewed as an investment in human capital in that these governmental transfers to parents should enable the parents to provide more and better child care yielding substantial benefits. The most important of these benefits is enabling children to avoid brain impairment; this in effect raises these children's mental capacities. Unlike many economically developed European countries, the U.S. lacks a paid parental leave program. Mainly because of this, child poverty rates in the U.S. are far higher than those in other developed nations (Pressman and Scott forthcoming, p. 20).

The second type of prevention involves improving parenting. If the parental environment plays a key role in children's neurodevelopment, and if, too often, parents are failing in this role, it makes sense to invest in parents' human capital in order to improve the quality of their parenting (Reardon, *NY Times* 2013).

"This means finding ways of helping parents become better teachers themselves. This might include strategies to support working families so that they can read to their children more often. It also means expanding programs like the Nurse-Family Partnership that have proved to be effective at helping single parents educate their children" (Reardon).

As Perry and Szalavitz (2006, p. 237) note, it is important to educate parents about the needs of infants and how to address them. Ideally, efforts along this line can help create a more infant- and child-literate society. Parents can also benefit from simply learning to take the time to pay attention and listen to

⁶ An alternative to the therapy Perry writes about is a treatment called child-parent psychotherapy in which parents can work with therapists to improve parent-infant attachment relationships and attempt to overcome the effects of trauma. A scientific evaluation of this type of therapy found it to be successful in a high percentage of cases (Tough 2012, p. 38).

their children (p. 244). Karr-Morse and Wiley (2012, p. 243) has proposed the creation of a 'Parenting Institute' which "would bring together key units of emotional developmental information from world-renowned experts, combined with the fundamentals of brain science." Note also that it is possible to improve the parental environment by including extended family members in childcare, especially the grandparents (Perry & Szalavitz 2006, p. 237).

Healthy Families New York has been particularly successful in helping new parents who are at risk for child maltreatment. Their Home Visiting Program has provided intensive in-home services to parents until their children enter school. These services are designed to promote positive parenting skills and parent-child bonding and interaction, prevent child abuse and neglect, promote child health and development, and enhance family self-sufficiency. A careful study of the child outcomes seven years later indicated the success of the program. Compared to a control group, children in the home-visited group were substantially less likely to repeat first grade, and performed above grade level in three behaviors that promote learning. Girls, especially, in this program were much more likely to perform above grade level on reading and math compared to the control group (based on a summary of details from Kirkland and Mitchell- Herzfeld (2012)).

The third type of prevention involves either preventing divorce or separation or providing a way for the missing parent, usually the father, to be available for regular parenting. If more marriages could be saved or more missing fathers could resume involvement in their children's lives, that would certainly be helpful (Appelbaum, *NY Times* 2013). It should be noted that there is no point in trying to keep husband and wife together if domestic violence is the highly likely outcome. That could be worse for the children than a marital breakup. In any case, there is a clear need for domestic violence services for victims and batterers as well as fatherhood programs which engage and teach young men how to be a father for their children. There is not sufficient space here to consider all the many things that could be done in this general vein.⁷

Remedies for moderately disadvantaged children

This section deals briefly with the kind of remedies suitable for moderately disadvantaged children, but not children requiring intensive individual therapy. The main candidate here is enriched preschool. The "flagship" example is the Perry Preschool Program. Because of its worthwhile features and because of the availability of data and analysis on it, it makes sense to focus on this program despite the fact that there are many other variants of enriched preschool.

The Perry Preschool started in Ypsilanti, Michigan in the mid-1960s as a two year experimental intervention for disadvantaged three and four year old African-Americans (Tough 2012, pp. xix-xxi). The children chosen were ones with relatively low IQ and socio-economic status; no children with untreatable mental defects were chosen (Heckman et al 2010, p. 116). The chosen children were randomly assigned to either a treatment group (Perry Preschool) or a control group (no preschool). The school program involved two and a half hour weekday morning sessions and a one and a half hour afternoon visit by a teacher to the child's home once a week (Heckman and Masterov 2007, p. 478; Heckman 2008, p. 308). The purpose of the latter was to involve the child's mother in the educational process:

"the curriculum was based on supporting children's cognitive and socio-emotional development through *active learning* where both teachers and children had major roles in shaping children's learning. Children were encouraged to plan, carry out, and reflect on their own activities through a plan-do-review process" (Heckman et al 2010, p. 116).

Follow-up interviews were done when the children reached ages 15, 19, 27, and 40 years old (p. 116). Information from these interviews has enabled researchers to learn how the preschool participants were doing in later life relative to the control group.

The findings from the Perry Preschool experiment are very noteworthy. First the preschool

⁷ For a more practical and comprehensive treatment of the subject, prevention of child maltreatment, see World Health Organization (2006, pp.32-49).

children's test scores showed an initial IQ improvement, but this did not last after the third grade. The more important finding was the improvement in the preschool children's noncognitive skills such as curiosity, self-control, social fluidity, and motivation (Tough 2012, p. xx; Heckman 2008, p. 308). These improvements led in turn to a large number of improved behaviors and outcomes (relative to the control group). These included: more likely to graduate from high school, more likely to earn more than \$25,000 at age 40, less crime and delinquency, greater literacy, higher achievement test scores, decreased grade retention, reduced time in special education, more likely employed, less likely on welfare, lower teenage pregnancy, higher marriage rates, better jobs, more likely to own home, and higher 4 year college participation rate. As Heckman and Masterov (2007, p. 487) point out, the preschool intervention's greatest impact was in creating the attitudes and motivation (noncognitive qualities) that ultimately lead to the favorable outcomes.

It is important to note that preschools cannot duplicate what a well-functioning family gives its children (Heckman and Masterov 2007, p. 487). But enriched preschool can to some extent make up for the lack of a well-functioning family. That is what the Perry Preschool apparently has done. Moreover, programs like Perry Preschool that have a home visit component can "affect the lives of the parents and create a permanent change in the home environment," a change which continues to support the child even after the preschool has ended (Heckman 2008, p. 314). Heckman and his colleagues (2010) have attempted a careful, rigorous assessment of the Perry Preschool Program using the data from the intervention and the follow-ups. They estimate that "the overall annual social rate of return to the Perry program is in the range of 7-10 percent" (p. 115). These researchers also find that "the benefit-cost ratio for the Perry program ... ranges from 7 to 12 dollars per person, i.e., each dollar invested returns in present value terms 7 to 12 dollars back to society" (pp. 115-116). In other words, from a conventional economic standpoint, the investment in the Perry Preschool was very successful.

It is worth noting that the Obama Administration's recent preschool proposal has a general similarity to the Perry Preschool Program (see, for example, Brooks, *NY Times* February 14, 2013). One important difference is that the Perry program was only targeted at disadvantaged children; whereas the Obama plan aspires to "make high-quality preschool available to every single child in America."

As explained earlier, critical brain development occurs very early in childhood, and adverse childhood experiences and poor parenting can prevent necessary neurodevelopment from occurring. For this reason, it is important for remedial childcare to occur very early when young brains are plastic. That is why the Abecedarian Program is of particular interest. This program, like the Perry Program, served disadvantaged, mostly Afro-American children. The Abecedarian program started earlier (age 4 months), was more intensive (6-8 hours per day), and lasted longer (close to five years) than the Perry Preschool (Heckman 2006, p. 1901; Heckman and Masterov 2007, pp. 479, 481, 484-486). The Abecedarian Program's relatively favorable outcomes may at least in part be due to its starting earlier in the child's life.

One other preschool intervention should be noted. The intervention during the early 1990s in Jamaica involved psychosocial stimulation and nutritional supplementation of growth-retarded toddlers living in poverty (Gertler et al 2013). "The intervention consisted of one-hour weekly visits from community Jamaican health workers over a 2-year period that taught parenting skills and encouraged mothers to interact and play with their children in ways that would develop their children's cognitive and personality skills" (p. i). Twenty years later, the study participants were re-interviewed and the findings were analyzed carefully. The nutritional intervention did not have a long-term impact, but the stimulation "proved to have large impacts on cognitive [and psychosocial] development 20 years later" (p. 2). The analysis also showed that the stimulation increased average earnings of the participants (then about 22 years old) by 42 percent compared to the control group.

5. Needed: a caring economy and economics

According to Riane Eisler (2007; 2012), the problems associated with the lack of adequate childcare are part of a larger problem, i.e., the lack of a caring economy. And the latter is related to the fact that caring is not a central part of the economics discipline. Eisler (2007, pp. 16-17) defines caring work as "actions based on empathy, responsibility, and concern for human welfare and optimal human development." In Eisler's view,

the economy's rules and practices too often fail to satisfactorily value the "most essential human work: the work of caring for ourselves, others, and our Mother Earth." One part of the difficulty is that the household sector is generally excluded from the economic map toward which our economic thinking is directed. This is significant because the household sector is an important locus of caring behavior, especially early childhood caring (pp. 12-14). The exclusion of the household sector makes it difficult for economists, much less noneconomists, to think about how the economy's caring problems can be solved and how this is related to a more general difficulty, lack of full human development. What is needed is developing a more caring economy and economics, which would enable us to attain "a future where all children have the opportunity to realize their potential for consciousness, empathy, caring, and creativity—capacities that make us fully human" (Eisler 2012, p. 82). It is a future in which the full development of human capital of all people in higher and lower classes would be emphasized. In a caring economy, the recent breakdown of the household sector among the lower socio-economic classes and the deterioration of childhood caring there would not be tolerated.

6. A human capital future

Another useful overarching perspective is provided by Thomas Courchene (2001) who envisioned a "human capital future for Canadians." In an era of globalization and the rapid spread of knowledge and information technologies, Courchene realized that Canada needed to make a transition from a resource and physical capital based economy to an economy and society that was more competitive and based on skill. Moreover, he strongly believed that competitiveness needed to be integrated or balanced with equality of opportunity and social cohesion. Thus, the key to his economic development strategy is skill (or human capital) development for all citizens. And as Courchene pointed out, "the family is the effective locus for the production of human capital" (p. 11). Therefore, in keeping with his overarching themes, it makes sense to put a strong emphasis on early childhood development in order to counter adverse childhood experiences and growing inequality, and thereby build the needed human capital.

7. Conclusions

"The most reliable way to produce an adult who is brave and curious and kind and prudent is to ensure that when he is an infant, his hypothalamic-pituitary-adrenal axis functions well. And how do you do that? It is not magic. First, as much as possible, you protect him from serious trauma and chronic stress; then, even more important, you provide him with a secure, nurturing relationship with one parent and ideally two" (Tough 2012, p. 182).

The model developed above that explains the large educational inequality between the upper and lower income classes needs much more research. In particular, there is a need for 1) more and better data on the socio-economic incidence of ACEs and 2) sound empirical analysis to test the hypothesis embodied in the model. Nevertheless, more and more children from lower income, lower socio-economic backgrounds seem to be coming from broken homes and have single parents. There is at least some reason to believe that these are the children most likely to have high ACE scores and less likely to have a secure attachment with a parent. Moreover, there is evidence that they have below-average executive function skills, difficulty handling stressful situations, poor concentration in the classroom, inability to sit still and follow directions, impaired social skills, and are perceived as misbehaving (p. 192). These children need and deserve help. They need the kind of carefully targeted human capital investment that will enable them to ultimately arrive at school and their work with their brains unimpaired.

Because too many of these kids are not ready for school and are unable to become productive, skilled workers, fewer of them are graduating from high school and fewer are entering the labor force. Not only is this producing greater inequality but it is lowering the economy's productivity. In short, it is a waste of human resources. This is a situation that cries out for intelligent investment in humans, in particular investment in early childhood development. This paper provides some guidelines regarding the main kinds of

human capital investment that are needed. It also suggests that these efforts would work best if they were part of an overall effort to create a caring economy which values the development of a high level human capital strategy.

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